PURBANCHAL UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY

SYLLABUS

M.Sc. in Nutrition and Dietetics

2021

College of Applied Food and Dairy Technology

CAFODAT

Affiliated to Purbanchal University & CTEVT

PURBANCHAL UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY

SYLLABUS

M.Sc. in Nutrition and Dietetics

2021

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GENERAL INFORMATION

Introduction

Nutrition is very important for health and well being. This subject has global importance and is much more significant to the developing countries where there is disadvantage in socio economic conditions, poverty and very low hygienic standards.

The poverty of people and their poor hygienic status, poor literacy, lack of safe drinking water and hygienic food and problems of malnutrition and under nutrition is some of hurdles for human resource development in developing countries.

Till now, there are no Universities / colleges for teaching, learning and research in nutritional science in higher level in our country. Likewise, since last 10 years, many medical colleges, hospitals and nursing homes have come into existence but there is lack of dietitians. To fulfill the need of such human resource, Purbanchal University has taken initiation of this noble job by launching M.Sc. in nutrition and dietetics course.

Objectives

The objectives of starting M Sc. in Nutrition & Dietetic are:

1. To produce higher level human resource in Nutrition and Dietetics.
2. To fulfill the current need of nutrition graduates required in different fields.

Eligibility for Admission

The candidates who have passed the 4 years bachelors degree in Science & Technology based curriculum such as B. Tech Food, B. Tech Dairy, B.Sc. in Nutrition, Nursing/B.N, Public Health, Agriculture, Animal Husbandry, Biochemistry, Biotechnology, Pharmacy, Medicine or equivalent degrees from recognized Universities shall be considered to apply for admission to M Sc. Nutrition and Dietetics program. Students of less than four years biological sciences group such as microbiology, biochemistry, chemistry and biology etc are also eligible for admission. However, they have to complete non-credit course in food, nutrition and health related subject during study period.

Admission Procedure

An applicant seeking admission needs to pass the entrance examinations conducted by P.U. The selection of students for admission will be done on merit basis.

The Course Structure

- The courses will be of two academic years divided into four semesters. The total credit hours allocated for this post graduate program will be 75 credit hours.
- One Credit hour equivalent to 15 lecture classes. Each credit incorporates score of 25 marks.
- There will be time to time hospital/community and research laboratory visit.
- During 4^{th} semester, students will have to undergo internship in hospital / community for duration of 2 months. Students shall submit the report after the

completion of their internship.

- The student should complete research based dissertation at the end of the fourth semester.
- Topic for the thesis will be decided after recommendation from the Research Committee and approval from Chairman of the same committee.

Examination System

- All the students will have to appear in theory and practical examinations at the end of the each semester.
- Two compulsory seminars will be organized in fourth semester and the students have to participate in it.
- Thesis defense will be conducted by the Dean Office, Faculty of Science and Technology, P.U.

Evaluation System

Pass marks for internal assessment, theory and practical is 40%. Student must pass in internal assessment, theory and practical exams separately.

Grading

EQUIVALENT MARKS	LETTER GRADES	GRADE VALUE	REMARKS
90 and Above	**A+**	**4.00**	
80 and Below 90	**A**	**3.75**	
70 and Below 80	**B+**	**3.50**	
60 and Below 70	**B**	**3**	
50 and Below 60	**C**	**2.50**	
40 and Below 50	**D**	**1.75**	
Below 40	**F**	**0.00**	**Fail**
Not Qualified(NQ)/Absent	**I**	**-**	**Incomplete**

Degree Name

Masters of Science in Nutrition and Dietetics

Summary of Syllabus
M.Sc. Nutrition and Dietetics
(Revised November 2021)

First Year

First Semester

S.N.	Subject code	Subjects	Credit (Theory)	Credit (Practical)
1.	MND 111	Human Physiology	2	1
2	MND 112	Nutritional Biochemistry	2	1
3.	MND 113	Human Nutrition	2	1
4.	MND 114	Food Science	3	1
5.	MND 115	Food Safety and Toxicology	2	
6.	MND 116	Food and Medical Microbiology	2	1
7.	MND 117	Applied Food Nutrition	2	

Second Semester

S.N.	Subject code	Subjects	Credit (Theory)	Credit (Practical)
1.	MND 221	Nutrition and Dietetics-I	3	1
2.	MND 222	Nutrition Education and Communication	2	1
3.	MND 223	Functional Foods & Nutraceuticals	2	
4.	MND 224	Advanced Nutrition Assessment	2	1
5.	MND 225	Global Nutrition	2	
6.	MND 226	National Nutrition Policy, Plan and Programs	2	1
7.	MND 227	Maternal and Child Nutrition	2	1

Second Year

Third Semester

S.N.	Subject code	Subjects	Credit (Theory)	Credit (Practical)
1.	MND 331	Nutrition and Dietetics II	3	1
2	MND 332	Nutrition Project Planning and Proposal Writing	2	1
3.	MND 333	Research Methodology	2	
4.	MND 334	Biostatistics	2	1
5.	MND 335	Nutritional Epidemiology	2	1
6.	MND 336	Nutrition and Dietetics Class Seminar I		1

Fourth Semester

S.N.	Subject code	Subjects	Credit (Theory)	Credit (Practical)
1.	MND:441	Internship in Public and Private Organization, Hospital and Communities	0	2
2.	MND:442	Nutrition and Dietetics Class Seminar II	0	1
3.	MND:443	Nutrition and Dietetics Research (Thesis Work)	0	16

Total credit: 75

Theory = 41
Practical = 34

M.Sc. Nutrition and Dietetics

First Semester

Subject: Human Physiology (2+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	First	Credit hour	2	1	-
Course code	MND 111	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

Understand the structure and physiology of various organs in the body

Obtain a better understanding of the principles of Nutrition and Dietetics through the study of Physiology.

Course Description:

The course generalizes the normal biological function in human body that includes function of cell, tissues, organs and systems etc. Different systems running in our body, described here, provide the knowledge of general human physiology which will be helpful for nutrition and dietetics expert during nutrition planning in their profession. Dietitian and Nutritionists will be able to prescribe diet chart to the patients only if they know and correlate it with normal Human Physiology.

Course No MND 111	Course details	Lecture 30 hours
	General Physiology: • Cell structure and function • Transport across cell membrane • Intercellular connections and communications • Functional organization of the human body • Concept of Homeostasis, positive and negative feedback mechanism • Introduction to concept of Pancha kosha (Ayurvedic concept) • Body fluids compartments and Bath, Kuf, Pitta (Ayurvedic concept) • Blood, composition of blood, cell types	
	Nervous system: • Nerve, Resting Membrane Potential, Action Potential, Impulse transmission. • General idea about how sensory and motor system works • ANS and flight and fight response (stress) • Hypothalamus and its function, feeding and satiety centre, linking it with obesity and malnutrition • Special senses: Brief Physiology of taste, vision and smell its role in nutrition	
	Endocrine system: • Introduction to various endocrine glands in Human body (Pituitary, thyroid, Parathyroid, adrenal, pancreases, gonads), hormones released, regulation and function	
	Respiratory system: • Brief idea about mechanics of breathing and regulation of respiration • Gaseous exchange and transport of Oxygen and Carbon dioxide	
	Circulatory system • Structure and function of heart and blood vessel, conduction system of heart • Blood pressure regulation and importance of nutrition	
	Reproductive system • Functional anatomy of male and female reproductive system • Spermatogenesis, Oogenesis, Ovulation, menstruation, hypothalamic-Pituitary-Gonadal-Axis (HPG Axis), Premenstrual Syndrome (PMS) • Physiology of Pregnancy and role of nutrition • Physiology of lactation and breast feeding	

	Urinary system • Functional anatomy of kidney and nephrons (parts and functions) • Formation, concentration and dilution of urine • Excretion of urine (micturition) • Electrolyte and acid /base balance	
	Gastrointestinal system • Functional anatomy of GI tract along with Enteric Nervous System • Physiology of digestion and absorption • Functions of salivary glands, stomach, Pancreases, liver, gall bladder. • Physiology of HCl secretion, • GI reflex: Deglutition, vomiting & Defecation	
	Muscular skeletal system • Structure of skeletal muscle system, Neuromuscular junction (NMJ) • Difference between cardiac, smooth and skeletal muscles • Calcium metabolism and Bone growth, nutritional aspect • Axial and appendicular Skeletal system, NMJ	
	Lymphatic system and Immune system • Lymph, lymphatic vessels, Lymphoid organs: lymph nodes, thymus, tonsils, spleen • General introduction of immune system: Acquired and innate immunity • Non-specific and specific immunity, phagocytic cells, inflammation, humoral and cell mediated immunity • Brief idea about Hypersensitivity (allergy), food allergy, Auto immunity	

Practical:

- Measurement of blood pressure and pulse rate.
- Effect of physical exercise on blood pressure and pulse rate.
- Determination of blood group: Duke's method, Wright's method
- Microscopic examination of cheek cell, saliva and blood; analysis of saliva
- Case discussion focusing on Nutritional aspect: Diabetes, Gastritis, Hyper/Hypo-thyroidism, Hypertension, stones and few common problems.
- Complementing theory for the study of human physiology using posters, pamphlets, presentation in class
- Reviewing scientific papers and articles

Text books:

1. Vander, Sherman, & Luciano's Human Physiology: The Mechanisms of Body Function. Eric P. Widmaier. McGraw-Hill Higher Education.
2. Text book of Anatomy and Physiology. Mrigendra Amatya. Heritage Publisher and Distributors.

Reference books:

1. Textbook of medical physiology / Arthur C. Guyton, John E. Hall. 13th edition. Elsevier
2. Essentials of Medical Physiology. Anil Baran Singh, Mahapatra. Current Books International.
3. Ayurvediya Kriya Sarira (A text book of Ayurvediya Physiology). Yogesh Chandra Mishra. Chaukhamba Publications, New Delhi.
4. Ayurveda , The Gentle Health System . Hans H. Rhyner. Sterling publishing company (USA).

M.Sc. Nutrition and Dietetics

First Semester

Subject: Nutritional Biochemistry (2+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	First	Credit hour	2	1	-
Course code	MND 112	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Increase the knowledge of biochemistry acquired at the graduate level
2. Understand the mechanisms adopted by the human body for regulation of metabolic pathways
3. Develop an insight into interrelationships between various metabolic pathways
4. Understand integration of cellular level metabolic events to nutritional disorders and imbalances

Course Description:

The mentioned course contains the regulation of metabolism, the specific role of enzymes and proteins in food industries, biochemical changes in foods like meat, milk, fruits and vegetables, cereals. This also contains the role of enzymes, coenzymes and trace elements in metabolism, nutrient deficiency and food preservation.

Course No. MND 112	Course details	Lecture 30 hours
	Carbohydrate metabolism • Digestion and Absorption, Glycolysis, TCA Cycle, Glycogenesis & Glycogenolysis, Gluconeogenesis, Pentose Phosphate pathway, Minor metabolic Pathways of Carbohydrate, Inborn Errors of Carbohydrate metabolism	
	Dietary fiber, function and metabolism	
	Lipid metabolism • Introduction to Lipid, Digestion & Absorption, Lipoprotein Metabolism, Fatty acids synthesis & Oxidation, Cholesterol Biosynthesis, Bile Acids and Bile salts biosynthesis, ketone body synthesis & utilization, TG Synthesis, Inborn errors of Lipid metabolism	
	Protein metabolism • Introduction to Proteins, Digestion and Absorption, Transamination, Deamination, ammonia transport & Urea Cycle, Metabolism of individual Amino Acids, Inborn Errors of protein and Amino acid metabolism	
	Fed and fasting states • Obesity (Prevalence, basis of obesity, calorie, health risks of obesity, weight management, Weight loss strategies) • Fasting & Starvation (Fasting Trend, role of fasting in weight management, Difference between fasting & starvation, metabolic changes in starvation, Food start after starvation)	
	Vitamins • Water & Fat soluble vitamins, structure, sources, absorption, transport, storage, excretion, Recommended Dietary Allowances (RDA) , function, deficiency & toxicity of water & fat soluble vitamins	
	Dietary supplements • Their use, social trends of supplements & health benefits & risks	
	Micro and macro minerals • Introduction, source, function, deficiency diseases.	
	Electrolytes • Water, body fluid balance, electrolytes and PH	
	Energy expenditure	

	Xenobiotic metabolism	
	Basics of Genetics • Introduction to Nucleic Acids, structure and function of DNA, and DNA replication, transcription, translation, Mutation	

Practical:

1. Estimation of carbohydrates
2. Estimation of proteins
3. Estimation of lipids
4. Estimation of minerals and vitamins
5. Estimation of amino acids and separation of amino acids using various techniques
6. Urine analysis
7. Estimation of serum glucose, protein, cholesterol, urea, creatinine, uric acid, bilirubin
8. Measurement of energy expenditure

Text books:

1. West & Tod; Textbook of Biochemistry
2. Jain JL; Fundamentals of Biochemistry; S. Chand & Co., India
3. Lehninger AL; Biochemistry; Kalyani Publisher, India

Reference Books :

1. Srilakshmi B; Dietetics; New Age International (P) Ltd. Publishers, India.
2. King FS & A Burgess; Nutrition for Developing Countries; Oxford University Press.
3. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol I & II; The Bangalore Printing and Publishing Co. Ltd., India.
4. Text book of Biochemistry by Dr. K. Rambabu, first edition 2007. AITBS Publisher, India.

M.Sc. Nutrition and Dietetics

First Semester

Subject: Human Nutrition (2+1)

Year	First	Teaching schedule(hours)	Lecture(theory)	Practical	Tutorial
Semester	First	Credit hour	2	1	-
Course code	MND 113	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

The course will enable the students to:

1. Get an insight into the role of nutrition in growth and development.
2. Understand the importance of nutrition in maintaining optimum body composition.
3. Understand the need for special nutritional considerations in altered climatic conditions.
4. To update students on the recent advance in Human Nutrition.

Course Description:

This course provides an integrated overview of the physiological requirements, functions and food sources of protein, energy, the major vitamins, minerals and water that are determinants of health and diseases in human populations. Subject matter also includes digestion and absorption, effects of nutrient deficiencies and toxicities, nutrient interactions, dietary guidelines, and the role of nutrition for healthy life style. The human life cycle begins at conception and ends at death. Humans start their journey even before they are born. Nutrition at various stage of human life cycle is also included.

Course No. MND 113	Course details	Lecture 30 hours
	Introduction: Nutrition, Nutritive value of food, Principle of DRI, RDI, RDA, FBDG	
	Body composition	
	Carbohydrates in diet and body	
	Lipids in diet and body	
	Protein and amino acid in diet and body	
	Protein quality and evaluation	
	Water soluble vitamins	
	Fat soluble vitamins	
	Energy balance and energy metabolism	
	Macro minerals	
	Trace minerals	
	Normal development effects on nutritional requirements	
	Nutrition in pregnancy, lactation, growing years, adult years and elderly	
	Food requirements through the life cycle	
	Nutritional status of Nepalese people and their assessment • Anthropometric, clinical and biochemical	
	• Nutrient assessment, use of nutrient analysis program; computer application in nutrition, use of NUTRO Program, nutrition counselling	
	Eating disorders	
	Nutrition and fitness	
	Oriental concept (satwic, Tamasic, Rajasic etc) foods	

Practical :

1. Community field visit to study different aspects of nutrients in human life cycle
2. Study on general focus with micronutrients malnutrition (iron, iodine)
3. Community exercise on counselling, nutrition education
4. Anthropometric measurement
5. Biochemical tests and blood sugar, urea, Fe etc

6. Clinical examination on Vitamin A deficiency, Anemia, Kwashiorkor and Marasmus
7. Nutritive value analysis of food by using Food Composition Table.

Text Books :

1. Gutrie HA, Picciano MF. Human Nutrition. New York

Reference books:

1. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol I & II; the Bangalore printing and Publishing Co. Ltd., India.
2. Shils ME, Olson Ja, Shikke M, Rose AC. Modern nutrition in health and diseases. 9th edition Philadelphia: Lea and Febiger .
3. Bowman BA, Russell RM. Present knowledge in nutrition. 8th ed ILSI 2001.
4. Machlin LJ. Handbook of vitamins. New York, Marcel Dekker.
5. K. Park. Park's Text book of Preventive and Social Medicine, 26th edition, Jabalpur , India 2021
6. Text book of Nutrition by Mahtab S. Bamji, N. Pralhad Rao , Vinodini Reddy (editors),India.
7. Brown, M.L. (Ed). Present Knowledge in Nutrition, 6th Edition, International Life Sciences Institute, Nutrition Foundation, Washington DC., 1990

M.Sc. Nutrition and Dietetics

First Semester

Subject: Food Science (3+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	First	Credit hour	3	1	-
Course code	MND 114	Lecture hour	45	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	60	25	15	-	100	-
Pass marks	24	10	6	-	40	
Duration	3 hours	-	3 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand the composition of food products
2. Design the process of production of nutritious food products

Course Description:

Food science is a study concerned with all technical aspects of food beginning with harvesting or slaughtering and ending with its cooking and consumption. It is considered one of the life sciences and is usually considered prerequisite of nutritional studies. The aim to teach food science for the students of M.Sc. Nutrition is to provide general knowledge of food science which include the basic components of food products, design of processes to produce food products, to provide brief insight into novel techniques of food processing and preservation and sensory evaluation of the product with trained expert panels or potential consumers, food additives and biochemical changes during processing of foods.

Course No MND 114	Course details	Lecture 45 hours
	Introduction: • Definition and scope of food science and , its inter-relationship with food chemistry, food microbiology and food processing, historical development of food presentation, an overview of modern techniques of food preservation and processing	
	Carbohydrates: • Introduction, classification, effect of cooking (gelatinization and retro gradation), uses of carbohydrates in food preparations	
	Fats and Oils • Introduction, classification, refining, hydrogenation and winterization, autoxidation (factors and prevention measures), flavor reversion, physical properties of fats and oils, effect of heating on fats and oils with respect to smoke point, commercial uses	
	Proteins • Basic structure and properties , type of proteins based on their origin (plant/animal), effect of heat on proteins (denaturation, coagulation), functional properties of proteins (gelation, emulsification, foamability, viscosity), commercial uses of proteins in different food preparations (like egg gels, gelatin gels, cakes, confectionary items, custard , soups, curries etc.)	
	Food processing • Definition, objectives, Post harvest operations, Principles of food preservation, types of treatment, effect of factors like heat, acid alkali on food constituents	
	Quality evaluation of food: • Introduction, QC & QA, Quality attributes, Principles of QC, Measurements of QA, and Objectives of sensory evaluation, Sensory assessment techniques, method & requirements.	
	Food Adulteration • Introduction, Food adulterants and their tastings methods, Current market practices	
	Food additives • Introduction, types and functions of emulsifiers, preservative, colorants, non-nutritive sweeteners, antioxidants etc**.**	

	Flavor • Definition, food flavors (tea, coffee, wine, meat, fish spices etc.), Flavor Enhancers	
	Browning in food: • Introduction, Types & Role in food preparation, Prevention of undesirable browning	
	High pressure processing: • Introduction, principles of high pressure processing, use of high pressure to improve food safety and stability, effect of high pressure on food quality, microbial aspects of high pressure processing.	
	Pulsed electric fields processing: • Introduction, mechanism of action, PEF treatment system, Pulsed electric field processing of liquid foods and beverages.	
	Irradiation of foods: • Introduction, fundamentals of food irradiation, wholesomeness of Irradiated foods, biological effects of irradiation	
	Microwave heating: • Introduction, dielectric properties of foods, heat transfer and mass transfer in microwave processing, microwave processing of foods.	
	Minimal processing of vegetables, fruits and juices: • Introduction, factors and processing operations that affect the quality of minimally fresh processed plant foods, microbial and sensory quality of minimally fresh processed fruits and vegetables	
	Food Fortification • Introduction, objectives, strategy, technology, ideal vehicle, nutrients & premix ideal fortificants, examples of fortified food in market, laws related to fortification	

Practical:

1. Analysis of proximate composition of foods.
2. Physical & chemical quality evaluation of foods
3. Sensory evaluation of foods
4. Post-harvest treatment of foods
5. Adulteration test of food
6. Visit of food processing industries.

Text Books:

1. Potter NP (1996); Food Science, 3rd ed; CBS pub, Dist, India
2. Meyer LH; Food Chemistry; CBS Publishers & Distributors, New Delhi, 1987
3. Food Process Technology: Principles and Practice (Second edition), PJ Fellows
4. Emerging Technologies for Food Processing: edited by Da-Wen-Sun, Food Science and Technology, International Series.

Reference books:

1. Belitz HD & Grosch D; FOOD CHEMISTRY; Springer, 1999
2. Food Processing: Principles and Application, J. Scott Smith & Y.H Hui, Blackwell publishing
3. Hand Book of Food Preservation; M. Shafiur Rahman, CRC press Essentials of Food Chemistry J.B. K.C and B.K. Rai second edition 2015 ; Publisher Mrs. Maya K.C., Anamnagar , Kathmandu

M.Sc. Nutrition and Dietetics

First Semester

Subject: Food Safety & Toxicology (2+0)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	First	Credit hour	2	-	-
Course code	MND 115	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	-	10	-	50	-
Pass marks	16	-	4	-	20	
Duration	2 hours	-	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Define toxicity
2. Discuss different types of toxic factors found in food and food additives, influence of toxicity to human health, regulatory limits of toxin and so on.
3. Know the concept of food security, food safety and Quality and emerging issues on food adulteration and food safety.

Course description:

The concept of food safety translates public health risk into a definable goal: a specified maximum frequency and/or concentration of different hazards in a food at the time of consumption, which is deemed to provide an appropriate level of health protection. It also enables to know the principles of Hazard Analysis Critical Control Point (HACCP) and other food quality management and quality assurance tools of food safety at national and international scenario.

Course No. MND 115	Course details	Lecture 30 hours
	Concept of food security, food safety and Quality and emerging issues on food adulteration and food safety	
	Preventive tools of food safety, quality management and quality assurance systems and brief introduction of HACCP/GHP etc.	
	Introduction of laws related to food safety in Nepal, food laws, regulations and food standard formulation and development at national and international level.	
	National and international food safety system and related organizations, WTO and its provision of sanitary and phytosanitary measures (SPS), Codex, Infosan etc.	
	Roles of Government, producers, traders, consumers and their organizations for food quality management and food safety. General introduction and history of food toxicology and natural toxins in food from plant and animal sources.	
	Anti nutritional factors found in different food & their effects on human health & nutrition	
	Basic concept of nutrigenomics & toxicogenomics, functional genomics & safe diets. Concept of receptors mediated gene-expression, modulation in food toxicology	
	Food contaminants: Toxicology of metal such as Lead, mercury, cadmium, Arsenic, copper, selenium etc. Toxic residue of environmental pollutants etc.	
	Food additives & their toxic effects such as preservative, texture enhancers, stabilizers, sweeteners, coloring agents, ripening agents, etc	
	Regulatory limits of toxin & contaminants, status of Food Standard of Nepal in relation to limits of toxin & contaminants.	
	Food allergy and Food sensitivity due to food toxins and contaminants, emerging issues of functional and GMO foods in relation to toxicological aspects	
	Concept of risk analysis and toxicological risk assessment of food	
	Concept of xenobiotic compounds, biotransformation & kinetics, influence of nutrition, age, gender & biotransformation	
	Persistent organic pollutants (POPs) in human food chain	
	Toxicity from drinking water, Vitamins and micronutrients.	

	Pesticides, growth hormones, veterinary drugs and other agrochemicals and their residue in food chain and toxic effect to human health.	

Text Books:

1. Omaye, S.T. Food and Nutritional Toxicity, CRC Press Inc. (2004)
2. Helferich, W. and Winetr, C.K. Food Toxicology, CRC Press Inc. (2000)
3. Shibamoto, T. Bjeldanes, L.F. and Taylor, S. Introduction to Food Toxicology, Academic press. (1993)
4. Aarhus, Quality and risk management.
5. Related official website and publications of government of Nepal, WTO, Codex, Infosan etc.

Reference books:

1. A text book of forensic medicine and Toxicology, Principles and practice second edition Krishna
2. Biochemical aspects of nutrition-Z. S. C. Okoye
3. Brown, M. L. (Ed.) Present Knowledge in Nutrition, VI Edn, International Life Sciences Institute, Nutrition Foundation, Washington D.C. 1990
4. Mark, J. (Ed.) A guide to the Vitamins. The role in health and diseases. Medical and Techninal Publishing Co. Ltd. England, 1975.
5. Jay JM; Modern Microbiology; CBS Pub & distributers, New Dehli, 1999

M.Sc. Nutrition and Dietetics

First Semester

Subject: Food and Medical Microbiology (2+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	First	Credit hour	2	1	-
Course code	MND 116	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand food and water borne diseases, microbial risk assessment and their control.
2. Understand the emerging issues of food and microbiology and give orientation, knowledge and skills on food and medical microbiology.

Course description:

This course deals with brief history of food microbiology and introduction to important microorganisms in foods; cultivation of microorganisms, nutritional requirements of microorganisms, types of culture media used, methods of isolation; Primary sources of microorganisms in foods, physical and chemical methods used in the destruction of microorganism in foods (Sterilization and Disinfection); fundamentals of control of microorganism in foods, extrinsic and intrinsic parameters affecting growth and survival of microbes; use of high and low temperature, dehydration, freezing, freeze-drying, irradiation and preservatives in food preservation; food spoilage, contamination and spoilage of different kinds of foods by microorganisms such as cereal and cereal products, vegetables and fruits, fish and sea foods, meat and meat products , eggs and poultry , milk and milk-products, canned foods.

Course No. MND 116	Course details	Lecture 30 hours
	Introduction • General history of food and medical microbiology • General introduction of modern food and medical microbiology	
	Food and water borne diseases • Bacterial: Cholera, Shigellosis, Typhoid fever • Viral: Rota Viral Diarrhoea and Polio • Protozoan: Amoebiasis, Giardiasis. • Signs and symptoms of different types of food poisoning, methods of preventing food poisoning	
	Microbial genetics • Bacterial DNA structure, replication and expression • Genetic recombination in bacteria • Gene cloning	
	Control of microorganisms by physical and chemical agents	
	Sampling food products for microbiological food safety (pathogens), microbiological quality and sampling plan	
	Microbial ecology, human intestinal microflora, probiotics, prebiotics, and symbiosis	
	Molds: • Fungi of medical importance, fungi important in food; • Contamination, spoilage and control of food	
	Antibiotics • Modes of action of antibiotics • resistance to antibiotics • clinical use of Antibiotics • Introduction to antiviral drugs.	
	Immunology • Introduction of antigen and immunoglobulin • Antigen-antibody reactions: Introduction, significance and types; precipitation, agglutinations, complement fixation reactions, labeled assays (ELISA, IFA, RIA)	
	Some techniques • PCR, Western blotting Gel electrophoresis • Plate counts methods • MPN method, Membrane filter, MBRT and Resazurin tests	
	Culture media • Introduction, types and uses	

	Isolation of Pure Culture and Enumeration • Spread plate, Streak Plate and Pour plate methods	
	Staining Techniques • Introduction, Principle of staining • Types of staining: Simple Staining, Negative Staining, Gram Staining, AFB Staining	
	Microbial Risk Assessment • Introduction risk assessment procedures • Quantitative microbial risk assessment (Q-MRA)	
	Quality control of foods using microbiological criteria • Control at source • Codes of good manufacturing practices (GMP), Hazard analysis and Critical control point (HACCP), ISO 9000 series, ISO 22000.	

Practical:

1. Safety measures in clinical laboratory
2. Preparation of Culture Media for bacterial and fungal growth.
3. Isolation of pure cultures: Streak Plate Method, Spread Plate Method, Pour Plate Method
4. Staining techniques: Simple staining, Negative staining, Gram staining, AFB staining
5. Enumeration of microorganisms by direct examination plate count, MPN method, Membrane filter method, Methylene blue reduction time test (MBRT), and Resazurin test in foods.
6. Biochemical tests: O/F test, starch hydrolysis test, Gelatin liquefaction test, catalase test, oxidase test, IMVIC test, Fat hydrolysis test, Coagulase test.
7. Systematic grouping of pathogenic bacteria, Identifying characteristics of common pathogenic bacteria.
8. Sero diagnosis: Blood grouping, pregnancy test, ASO test, Widal test, HBsAg detection, HIV test

Textbooks:

1. Frazier W.C. & Westhoff D.F. Food microbiology. Tata McGrow Hill publishing company Ltd, New Delhi.
2. James M. Jay. Modern food microbiology,CBS publisher and disributors, New Delhi.
3. Chakraborty P : A Text book of microbiolgy. New Central Book Agency Pvt. Ltd., Chintamoni Das Lane,Kolkata.
4. Ananthanarayan & Paniker: Textbook of medical microbiology, Orient Longman Ltd 160,Anna salai, Madras-600002.

Reference books:

1. Harrigan W.F. Margaret & Mcannce E. Laboratory Methods in Food and dairy Microbiology. Academic Press, London.
2. Pelczar, REid & Chan. Microbiology. Tata Mcgraw Hill Publishing, New Delhi.
3. Adams, MR. and Moss, MO. Food Microbiology Published by new Age International (P) Ltd. Publisher New Delhi.
4. Harry W. Secley and Paul J. Van Denmark. Microbes in Action (A Laboratory manual of microbiology) Published BY D.B. Taraporevala & sons Pvt. Ltd, Bombay, India.
5. Dubey R.C. & Maheshwari D.K.: Practical microbiology S. Chand and Company Ltd New Delhi-110055, india.
6. Banson JO Ellen & SydneyM M. Finegold. Bailey and Scott Diagnostic Microbiology C. V. A. Mosby Company. USA.
7. Cheesbrough, Monica. Medical Laboratory Manual for Tropical country Vol II ELBS.

M.Sc. Nutrition and Dietetics

First Semester

Subject: Applied Food Nutrition (2+0)

Year	First	Teaching schedule(hours)	Lecture(theory)	Practical	Tutorial
Semester	First	Credit hour	2	-	-
Course code	MND 117	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	-	10	-	50	-
Pass marks	16	-	4	-	20	
Duration	2 hours	-	2 hours	-	-	-

Objectives:

At the end of this nutrition course the students will be able to:

1. Describe functions of food groups, development and health
2. Describe basic local good groups nutrition and healthy foods
3. Understand the interaction between nutrients and infections
4. Learn the importance of hygiene and sanitation
5. Aware of eating habits, cultural and social influences in the society

Course Description:

After completing this nutrition course the students will be able to interpret what the scientific facts tell us about nutrition and health, understand why we eat what we eat, explain the nutrition standards and guidelines, describe the processes of digestion, absorption, and transportation. Describe the major nutrients, vitamins, and minerals and their roles in body. Understand the concept of energy balance and weight control, recognize the relationship between physical fitness, health and nutrition, evaluation of own diet, understand the impact of culture on health and food choices. In this nutrition course the students will explore the newest frontiers in nutrition and how to apply nutrition principles to their own food choices. Solidly based on science, this course will help students to understand how key nutrients affect health, disease, energy balance, and weight control. Additionally, students will gain knowledge of the impact of culture on health and food choices.

Course No MND 117	Course details	Lecture 30 hours
	• Interpretation of the scientific facts tell us about nutrition and health. • Understand why we eat what we eat. • Explanation of the nutrition National as well as Global (WHO) standards and guidelines. • Processes of digestion, absorption, and transport. • Major nutrients, vitamins, and minerals and their roles in the body. • Physiology , and health concerns of pregnant and lactating women , infant , children, adolescents, adults and older adults; • Macro and micro nutrients and their specific functions in the metabolic process, interacting cellular physiology, biochemistry and nutrition; • Current hot topic in nutrition, integrated with discussion, debate, and presentation • Concepts of energy balance and weight control. • Relationship between physical fitness, health, and nutrition. • Relationship between diet and health. • Nutritional consideration for sports/exercising person as compared to normal active person • Importance of micronutrients for Exercise • Importance of Fluid balance in different types of sports and exercise and use of sports drink. • Methods of evaluation of own diet. • Impact of culture on health and food choices • Entrepreneurship in the field of nutrition and dietetics	

Reference books:

1. Nutrition Concepts and Controversies, 7th edition, Wadsworth Publishing Company, 1997
2. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol I & II; the Bangalore printing and Publishing Co. Ltd., India.
3. M.K.Schmidl and TP Labuza; Essentials of functional foods, Spronger International, 2000.
4. Advances in Sports and Exercise Science: Nutrition and Sport, Edited by Don Maclaren, ChPublished by Churchhill Liningstone, Elsevier, 2007
5. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition, Edited by Judy A Driskell, Ira Wolinsky, CRC Press 2000.
6. Richardson T & Finley JW; Chemical Changes in Food during Processing; CBS Publishers & Distributors, New Delhi, 1998.
7. De Man JM; Principles of Food Chemistry; Kluwer Publications, 1999

8. Nutrition across the Life Span Second Edition, Medtech, 2015
9. Child Nutrition and Health by Ramesh K. Adhikari and Miriam E. Krantz, Fourth edition, 2013.
10. IYCF training manual By MoHP 2069 BC .
11. Text book of Nutrition by Mahtab S. Bamji, N. Pralhad Rao , Vinodini Reddy (editors), India.
12. Brown, M.L. (Ed). Present Knowledge in Nutrition, 6th Edition, International Life Sciences Institute, Nutrition Foundation, Washington DC., 1990

M.Sc. Nutrition and Dietetics

Second Semester

Subject: Nutrition and Dietetics-I (3+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	3	1	-
Course code	MND 221	Lecture hour	45	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	60	25	15	-	100	-
Pass marks	24	10	6	-	40	
Duration	3 hours	6 hours	3 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand all aspects of nutrition including nutritional science and therapeutic nutrients
2. Determine nutritional status and various diseased conditions related to diet
3. Plan and prepare therapeutic diet to patient suffering from different diseases
4. Understand counselling techniques to conduct dietary counselling for patients

Course description:

Most of the diseases could be alleviated through the balance diets and diets therapy. However, the individual's dietary requirements differ from one another and influenced by many factors such as age, sex, height, weight, cultures, social and economic background, mental and emotional state, food habits, nature of the work, individual likes and dislikes towards foods, climatic conditions, family and medical history, disease conditions. The course includes some practical aspects of nutrition and dietetics such as determination of nutritional status and various diseased conditions related to diet.

Course No MND 221	Course details	Lecture 45 hours
	• Nutritional deficiency Disorders such as, PEM, anemia, Disorders due to the deficiency of Iodine, Vitamins and their precursors, trace elements (Zn, Se, Fe, Cu etc.) and their dietary management	
	• Principle of diet therapy and factors in planning therapeutic diets	
	• Routine hospital diets (modification in consistency and texture, clear liquid, full fluid diet, modification of diet in nutrients	
	• Special feeding methods (intravenous feeding, tube feeding	
	• Pre and post-operative diets	
	• Food allergy	
	• Anti-nutritional factors in food	
	• Malnutrition and psychosocial development	
	• Balanced diet and dietary standards	
	• Development and Management of Food Composition Data	
	• Development of nutrient enriched food & diet	
	• Menu planning and serving of food	
	• Nutrition for infants, preschoolers and children	
	• Diet for hospitalized patient	
	• Medical food preparation	

Practical:

1. Estimation of energy requirement of a client with given height, weight, waist, hip, age and gender.
2. Dietary survey of a bedridden patient in hospital.
3. Preparation of nutrient enriched diet.
4. Dietary survey of school tiffin and nutritional assessment of student (School children)
5. Preparation of balanced diet, weaning food.
6. Food consumption study of low income groups and study of different types of disorders related to public health nutrition & prepare a report.

7. Development of food and diet composition data.
8. Tube feeding food and diet preparation.

Text books:

1. Swaminathan M; Textbook of Human Nutrition, Vol II; The Bangalore Printing and Publishing Co. Ltd., India.
2. Saarwal B, Public Health & Nutritional Care, Commonwealth Pub. 1999

Reference books:

1. Ghafoorunissa, Dietary Lipids and heart disease, the indian context. Natl. Med. J. Ind. 7, 1994
2. Steinmetz K. A. Potter J. d. Vegetables, Fruit and Cancer, Epidemiology, Cancer causes and control etc.
3. WHO & FAO, 2nd Ed. Report of a joint FAO/WHO expert consultation, Bngkok, Thailand, 21-30 September 1998
4. Dietetics by B. Srilakshmi, Eight edition .New Age International Publisher, 2019.
5. Nutritive Value of Indian Foods. NIN
6. Food Composition Tables for Nepalese. DFTQC. 2012

M.Sc. Nutrition and Dietetics

Second Semester

Subject: Nutrition Education and Communication (2+1)

Year	First	Teaching schedule (hours)	Lecture (Theory)	Practical	Tutorial
Semester	Second	Credit hour	2	1	-
Course code	MND 222	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand the differences between nutrition education and counselling
2. Understand and apply behavior change communication models
3. Develop nutrition education messages
4. Apply principles and steps of advocacy in developing nutrition policy

Course description:

The role of nutrition is important for the prevention and treatment of various forms and types of malnutrition as well as many lifestyle diseases. Effective nutrition education and communication could be instrumental in solving these nutrition related problems through sustained behavior change. The course provides knowledge on how to use the theories of behavior change in designing effective behavior change communication models and use them for improving food and nutritional behaviors and practices.

Course No. MND 222	Course details	Lecture 30 hours
	• **Introduction of nutrition education, objectives, scopes and approaches**	
	• **Role of good nutrition for one's health and prevention and management of lifestyle diseases**	
	• **Theoretical basis of nutrition education and communication:** Basic model of communication, verbal and non-verbal communication, models of behavior change- theory of planned behavior, health belief model, trans-theoretical model, communication persuasion model.	
	• **Nutrition counseling :** Analyzing and interpreting diet records, counselling, counselling interviewing and counseling skills, nutrition counselling and motivation, behavior modification, cognitive change, cross cultural and lifespan counselling	
	• **Nutrition education in the formal education:** Methods of making nutrition education effective in primary schools, secondary schools, colleges and integration of nutrition content in various curricula	
	• **Principles of individual and mass communication** How to communicate nutrition information to target audiences (news stories for newspapers, newsletters, radio and TV programs or interviews, development of educational brochures/materials	
	• **Nutrition education and communication for the public:** Targeting audience and need assessment, designing nutrition messages, identification of nutrition education tools, identification of channels of nutrition education, monitoring and evaluation of the outcome of nutrition education and the communication	

	• **Nutrition education and communication in the community :** Assessment of knowledge, attitude and practices of food and nutrition, identification of gaps, designing nutritional messages, use of various approaches including positive deviance, use of multiple actors and channels, identification of success indicators, monitoring and evaluation	
	Nutrition advocacy : Defining the objectives of the advocacy and identification of key indicators of success, assessment of the existing situation, identification of key messages and appropriate packaging of messages, use of formal and informal channels, monitoring and evaluation of advocacy interventions	

Practical:

1. Visual Aids (local food groups and RDA)
2. Case Study (Application of advocacy, school nutrition program, SBCC)
3. Critical review of application of Behavior Change Models in the published articles
4. Critically analyze the health and nutrition message promoted in the country/globally
5. Practice developing messages for the nutrition problems targeting literate as well as illiterate community group

Text books

1. F S King & B. Ann., Nutrition for Developing Countries, 2nd Ed. Oxford University Press, New Work.
2. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol II; The Bangalore Printing and Publishing Co. Ltd., India.
3. Holli, BB, Beto, JA. Nutrition Counseling and Education Skills for Dietetics Professionals. 6th Edition.Philadelphia, PA: Lippincott Williams and Wilkins. (2012)

Reference books:

1. Bhaskaram P. Interaction between Malnutrition and ection in Children, in Community and Social Padiatrics. Ed. S. R. Banarjee
2. Text book of Human Nutrition, 2nd Ed., Mathab S Bamni, N. Pralhad Rao, Vinodini Reddy, Oxford & IBH Publishers Co. Pvt, Ltd., New Delhi
3. Text Book of Health Education and Health Promotion by Prof. Hari Bhakta Pradhan

4. Rajvir Bhalwar (Chief editor). The text book of Community Medicine 4th edition, India
5. Nutrition for Developing Countries by Felicity Savage King Ann Burgess, 2018.

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Second Semester

Subject: Functional Food and Nutraceuticals (2+0)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	2	-	-
Course code	MND 223	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	-	10	-	50	-
Pass marks	16	-	4	-	20	
Duration	2 hours	-	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand the fundamental concepts and knowledge related to functional food.
2. Study chemistry and physiological effects of functional food.
3. Examine and assess the latest development in functional foods and nutraceuticals.
4. Apply the learned knowledge and develop functional foods for market.

Course description:

Functional foods have evolved as food and nutrition science and have advanced beyond the treatment of deficiency syndromes to reduction of disease risk. This course focuses on knowledge of bioactive food components, and their health benefits.

Course No MND 223	Course details	Lecture 30 hours
	• **Definition of Functional foods and Nutraceuticals, their classifications and associated claims**	
	• **Bioactive components of foods:** Sources, Chemistry, properties, functional benefits and nutraceutical potentials, their use in the prevention of potential diseases and effect of processing a) Carotenoids b) Lycopene c) Flavonoids	
	• **Antioxidants:** Definitions, sources, biochemical functions, free radical, reactive oxygen species (ROS) and oxidative shears and how each related to diseases, Antioxidant contents of fruits and vegetables, Anticancer activities of fruits and vegetables	
	• **Some of the functional foods with health promotion properties and their relevance to specific diseases** a) Soy foods b) Spices c) Herbs d) whole grain and legumes e) others	
	• **Probiotics and prebiotics and health benefits**	
	• **Market trends, consumers and the key drivers for functional foods and nutraceuticals**	
	• **Introduction to global and national regulations governing functional foods and nutraceuticals, their health claims**	
	• **Omega 3 PUFAs and their benefits**	
	• **Concept of dietary food/health supplement, RDA, Overdose, Toxicity, Nutritional labeling, formulation and rational, production , import and export practices**	

Text books:

1. Handbook of Nutraceuticals and functional foods, edited by Robert E.C. Wildman; CRC Press, New York
2. Phytochemical Functional Foods, Edited by Ian Johnson and Gary Williamson; Woodhead Publishing, Cambridge

Reference books:

1. Vegetables, Fruits and Herbs in Health Promotion, Edited by Ronald R. Watson; CRC Press LLC, New York.
2. Essential of Functional Foods ; Mary K. Schmidt, Thodore P. Labuza
3. Dietary Supplements Guidelines - DFTQC

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Second Semester

Subject: Advanced Nutrition Assessment (2+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	2	1	-
Course code	MND 224	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objective:

This course will enable the students to:

1. Define and use ABCD methods to measure Nutritional Assessment
2. Describe anthropometric measurements used for community level screening of malnutrition
3. Identify anthropometric indicators of the nutritional status for children, adults, and pregnant women
4. Identify children and adults with malnutrition by comparing their measurements to standard cut-off values
5. Assess micronutrient deficiencies using clinical sign and symptoms

Course Description:

This nutrition course will provide the following nutrition assessment information to the students: Nutritional status affects immune response and response to medical therapies, health care provides assess clients' nutritional status for many reasons e.g. identify people at risk of malnutrition for early intervention or referral before they become malnourished; identify malnourished clients for treatment -because malnourished people who are not treated early have longer hospital stays, slower recovery from infection and complications, and higher morbidity and mortality; track child growth ; identify medical complications that affect the body's ability to digest food and utilize nutrients. Optimal nutritional status – the state of the body with respect to each nutrient and overall body weight and condition-is a powerful factor promoting health and preventing and treatment diseases.Nutrition assessment includes taking anthropometric measurements and collecting information about a client's medical history, clinical and biochemical characteristics, dietary practices, current treatment, and food security situation.

Course No MND 224	Course Details	Lecture 30 hours
	Introduction: concept of nutritional assessment, importance, applications	
	Anthropometric Measurements ABCD methods to measure Nutritional Assessment: 1. Anthropometry 2. Biochemical/ biophysical methods 3. Clinical methods 4. Dietary method Anthropometric measurements used to assess growth: Measurement unit and Procedure ➢ Length/height ➢ Weight ➢ Head circumference ➢ Body Fat	
	Converting measurements to indices: ➢ Weight for age; (underweight) ➢ Height for age; (stunting) ➢ Weight for height (Wasting) ➢ BMI ➢ MUAC ➢ Waist circumference ➢ Hip circumference ➢ Waist /Hip ratio	
	Biochemical: blood, urine and stool	
	• **Clinical Assessment:** ➢ General Clinical examination: hair, angles of the mouth, gums, nails, skin, eyes, tongue, muscles, bones, and thyroid	
	• **Dietary Assessment**: ➢ Dietary history ➢ 24-hour recall ➢ Food frequency questionnaire ➢ Food Diary ➢ Observed food consumption	

	Tools to measure: ➢ Physical activity assessment ➢ Food security assessment ➢ Food diversity assessment ➢ Emergency food and nutrition assessment	

Practical:

1. Practice Anthropometric Measurement in the classes, schools, hostels and community
2. Practice Dietary assessment in the classes, hostels, canteen, hospitals, clinics with diet related Non Communicable Diseases (NCDs)
3. Practice Micronutrient Deficiency by clinical examination
4. Learn use of tools mentioned above

Text books:

1. Gibson R S. (2005) Principles of Nutritional Assessment. 2nd ed. Oxford University Press
2. Lee RD & Neiman DC. (2009). Nutritional Assessment.. 5th edition. Brown & Benchmark
3. Jelliffe, D.B. (1966). *The Assessment of the Nutritional Status of the community*, WHO Geneva.

References:

1. WHO (1995) Physical Status: The Use and Interpretation of Anthropometry Report of a WHO Expert Committee. WHO Tech Rep Series 854
2. WHO(2006) , WHO Child Growth Standards: Length/height for age, weight for age, weight for length, weight for height and body mass index (2006); Available at http://www.who.int
3. Cameron N. (1984). The measurement of Human Growth. Croom Helm Ltd. London and Sydney
4. WHO (2007), WHO Reference Data for children and Adolescents (5-19 years). WHO reference , Available at http://www.who.int/growthref/en/
5. WHO (2009), WHO Child growth standards: Growth velocity based on weight, length and head circumference. Available at http//www.who.int

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Second Semester

Subject: Global Nutrition (2+0)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	2	-	-
Course code	MND225	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	-	10	-	50	-
Pass marks	16	-	4	-	20	
Duration	2 hours	-	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Expose students to major global nutrition programs strategies designed to decrease the global burden of nutrition related morbidity and mortality
2. Be familiar with the key global organizations involved in Nutrition Policy and programs
3. Be able to map the causes of malnutrition and their consequences for health and societal development
4. Understand the global nutrition transition from communicable diseases to non communicable diseases (NCDs)

Course No. MND 225	Course details	Lecture 30 hours
	Overview and Issues in Global Nutrition • Introduction, objectives, importance, Focus areas, assignments, attendance and exams • Current and Emerging issues in Global Nutrition; Nutrition sensitive vs nutrition specific concept • An overview of world nutrition situation and assessment of problems of developing countries in light of prevalence, etiology, indicators and preventive measures	
	Global Nutrition Policy Review • Policies, strategies and plans related to nutrition; Policy environment for achieving the global nutrition targets; progress since the first global nutrition policy review; country progress in achieving the global nutrition and diet related NCD targets' Country progress on the six action areas of the UN Decade of Action on Nutrition ; nutrition actions and programs being implemented	
	Global Nutrition transition and obesity • Global nutrition transition and obesity in developing countries; Global gender disparity in obesity; Nutrition transition and chronic disease, WHO Global Nutrition policy review 2016 – 2017	
	Food Consumption pattern • Introduction, countries data, pattern , issues, relation to nutrition status of developed and developing countries	
	Global Breastfeeding and complementary feeding • Global breastfeeding and complementary feeding situation, issues, achievements, and trends	
	Global maternal and child nutrition • Maternal and child under-nutrition, over-nutrition in low-income and middle-income countries; world ;Nutrition and health programs to alleviate malnutrition: role of national and International Organizations, Millenium Development Goals (MDGs) and Sustainable Development Goals (SDGs)	

	Micronutrient deficiencies in the developing world • Micronutrient deficiencies in South Asia: current status and strategies and Trends; food fortification ; food fortification guidelines and its significance effect on public health; Global challenges of micronutrient malnutrition in the developing	
	Scaling Up Nutrition (SUN) Movement	
	Nutrition and maternal reproductive health and survival • Nutrition and maternal survival in developing countries; micronutrient supplement on pregnancy outcome	
	Global food insecurity and hunger • State of food insecurity in the world; biotechnology and food insecurity	
	Nutrition surveillance and Monitoring • Nutrition Surveillance Principles and practices; WHO methodology of nutritional surveillance; malnutrition surveillance food security nutritional and surveillance	

Reference Books:

1. Popkin, B.M., Adair, L.S., Ng, S.W. (2012). Global Nutrition Transition and the Pandemic of Obesity in Developing Countries. Nutrition .Review, 70, 3-21
2. Early Neonatal Feeding is Common and Associated with Subsequent Breastfeeding Behavior ain Rural Bangladesh. J. Nutrition 143: 1161-7
3. Black, R.E. et al (2013) Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries. Lancet, 3:382-396
4. Bhutta, et al(2013 Meeting the challenges of micronutrient in the developing world . Br. Med. Bull: 106(1):7-17
5. WHO, Global Nutrition Policy Review 2016-2017
6. Synopsis Global Nutrition Report: Actions and Accountability, to advance nutrition and sustainable development.

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Second Semester

Subject: National Nutrition Policy, Plan, and Programs (2+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	2	-	-
Course code	MND 226	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to**:**

1. Overcome the dietary, socio-economic and environmental constraints which lie at the root of the nutrition problem
2. Ensure the poorest segments of the population able to obtain, at least, the least expensive balanced diet (not just calories)
3. Provide full physiological development and functioning for full expression of their genetic potential for creative and productive work

Course description:

This course enables the students to learn Malnutrition affects all development sectors and has high social and economic costs such as increased mortality and morbidity, loss of human potential, decrease in skills and qualifications, lower productivity, and higher poverty. Some of these effects are intergenerational. Malnutrition can seriously jeopardize the achievement of the MDGs as well as SDGs. The fight against malnutrition is therefore of high priority given the continued deterioration of the nutrition situation in Nepal especially in women, child and adolescents, so adaption of a national nutrition policy based on the local problem is highly important. This policy has to be adapted to reliable to realities and specifics of the country and to its development goals. Identify strategies to resolve nutritional problem, mechanisms and institutional framework for the implementation as well as the costs and financing are detailed in this document also by taking into consideration the multi-sectoral aspect of malnutrition. This course will also provide opportunities to students to critical review National public, private and international organizations implementing nutrition projects in Nepal.

Course No MND 226	Topic details	Lecture 30 hours
	Nutrition Status • Determinants of Nutritional status of individual and populations • Nutrition and Non-nutritional **Nutritional Situation in Nepal indicators**: • Socio-cultural • Biological • Environmental • Economical • Assessment of nutritional status of individuals of different ages- MUAC, Weight for age, Weight for height, ponderal index, BMI. Application and limitations in different field situations- choice of an indicator **Major Nutritional Problems** : Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: • Macro and Micronutrient deficiencies • Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis • Overweight, obesity and chronic degenerative diseases **Approaches and Strategies for improving nutritional status and health** • National Food, Nutrition and Health Policies • Nutrition National Guiding Principles for the Nutrition Policy • Vision, Mission, Objectives and expected results of the National Nutrition Policy • National Nutrition policy implementation strategy and Implementation programs, Plan of action, Available resources (human, financial and infrastructure) • Multisectoral Framework for the Nutrition Program Implementation • Case studies of selected strategies and programs, their rationale and context, how to select inventions from a range of possible options: Food-based intervention including fortification, and genetic improvement of foods, supplementary feeding, Nutrition for behavior change **Concept of Public Nutrition:** • Relationship between health and nutrition • Role of public nutritionists in the health care delivery	

	Sectors and Public Policies relevant to nutrition and health **Primary Health care of the community:** • National Health Care Delivery System • Determinants of Health Status • Indicators of Health **Population Dynamics:** • Demographic transition • Population structure • Fertility behavior • Population policy • Fertility • International relationship between Nutrition and quality of life **Food and Nutrition Security** • Food Production ➢ Access ➢ Distribution ➢ Availability ➢ Losses ➢ Consumption • Food Security • Socio-cultural aspects and Dietary Patterns their implementation for Nutrition and Health • Laws related to food and nutritional security. **Health economics and economics of malnutrition** • Its impact on productivity and national development • Cost-Benefit: ➢ Cost effectiveness ➢ Cost efficiency	

Practical:

1. Case study (take one failure and one success nutrition interventions implemented in Nepal)
2. Critically review maternal and child nutrition project implemented in Nepal (private sector, public sector, I/NGOs (donor agencies)
3. Literature/documents review: Compare Nepal Nutrition policy and plan with regional countries nutrition policy
4. Develop a nutrition policy, plan and program (From literature review/documents view select one Maternal and child nutrition issue)

References

1. National Nutrition Policy and Strategy - Department of Health .http://dohs.gov.np
2. National Planning Commission developed nutrition documents: Multisectoral Nutrition Program (MSNP report)

3. Nutrition project implication and publications (different donor agencies funded projects e.g. USAID, UNICEF, WFP, GTZ, JAPAICO, AusAID, DEFID, World Bank,
4. Nepal Quest for Health by Hemang Dixit, Fourth Edition 2014
5. Nepal National Planning Nutrition policy, planning and project report
6. Acharya, KT (Ed) 1984 Interface between Agriculture, Nutrition and Food Science, The United National University
7. Gopalan, C. (Ed) (1987) Combating Undernutrition. Basics Issues and Practical Approaches, Nutrition Foundation of India
8. Kaufman M. (2007) Nutrition in promoting the public health strategies, principles and practices. Jones and Barlett Publishers
9. Edelstein S. (2006) Nutrition in Public Health, A handbook for developing programs and services, Second Edition. Jones and Bartlett Publishers
10. Goyet, Fish. V. Seaman, Jand Geijer, U (1978)The Management of Nutritional Emergencies in Large Populations , WHO, Geneva
11. FAO (1983) Selecting Interventions for Nutrition Improvement. A Manual Nutrition in Agriculture. No. 3
12. Klein, R.E. (Ed) 1979) Evaluating the Impact of Nutrition and Health Programs. London and New York, Plenum Press
13. Owen , A.Y. and Frankle, R.T. (1986) Nutrition in the Community. The Art of Delivering Services, 2nd ed, Times Mirror / Mosby
14. WFP/INHCR (1998). WFP/UNHCR Guidelines for Selective Feeding Programs in Emergency Situations. Rome and Geneva, WFP and UNHCR

M.Sc. Nutrition and Dietetics

Second Semester

Subject: Maternal and Child Nutrition (2+1)

Year	First	Teaching Schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Second	Credit hour	2	1	-
Course code	MND227	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Be familiar with physiological changes in pregnancy and lactation
2. Be familiar with growth and developmental changes from conception till adolescence
3. Understand the inter-relationship between nutrition and growth and development during life cycle
4. Apply their knowledge in community and public nutrition and health programs

Course Description:

This course provides a comprehensive introduction to the nutritional requirements of pregnancy lactation, infancy, childhood, and adolescence. Main topics include physiological and metabolic adaptations of pregnancy and lactation, maternal nutrition during pregnancy and lactation, composition of human milk and formula, feeding practices of infant and toddlers, and the nutrient requirements of infants, children, and adolescents. At the conclusion of this course, students will have gained a sufficient foundation in maternal and children nutrition, better understand the relevant scientific literature. Didactic lectures and guest presentations accompanied by class discussions will provide a breadth of maternal and child nutrition knowledge.

Course No MND 227	Course details	Lecture 30 hours
	Changing concepts and controversies in Maternal and Child Nutrition: • **Maternal Nutrition during Pregnancy:** ➢ Importance of nutrition prior to and during pregnancy ➢ Pre-requisites for successful outcome. Effect of undernutrition on mother-child dyad including pregnancy outcome and Maternal and Child Nutrition -Short term and Long term ➢ Physiology and endocrinology of pregnancy and embryonic and fetal growth and development ➢ Nutritional requirements during pregnancy ➢ Adolescent pregnancy ➢ Pregnancy and AIDS, Pregnancy and TB ➢ Intra-uterine growth retardation, critical windows of development and programming concepts ➢ Complications of pregnancy and management and importance of antenatal care ➢ Congenital malformations, fetal alcohol syndrome and gestational diabetes mellitus	
	Lactation and Infant feeding • Development of mammary tissue and role of hormones • Physiology and endocrinology of lactation, synthesis of milk components, let down reflex, role of hormones, lactational amenorrhea, effect of breast feeding on maternal health • Human milk composition and factors affecting breastfeeding and fertility, maternal nutritional status and milk composition • Management of lactation; prenatal breastfeeding skills education, rooming in, problems; sore nipples, engorged breast, inverted nipples • Exclusive breastfeeding, baby friendly Hospitals Initiative • Breastfeeding from HIV-AIDS mothers • Feeding of infants and children and dietary management, key issues in infant feeding	
	Infant Physiology and the preterm and LBW infants: • Implications for feeding and management, Growth and development during infancy, childhood and adolescence a. Normal pattern of growth and development b. Norms standards for growth	

	c. Growth monitoring and promotion, growth faltering, failure to thrive	
	Malnutrition in mother and children: • Etiology and management (in brief) • Consequences of malnutrition on physical development • Mental development • Cognitive development • Effect of deficiencies of specific nutrients • Current Nutrition and Health status of mother & children	

Practical:

1. **Counselling materials**: Develop counseling materials for breast feeding problems
2. **Case Study** (Maternal and Child program implemented by donor agencies; counselling mothers on child feeding and care practices)
3. **Literature /Documents critical review** (take one success and one failure MC nutrition program published)
4. **Compare regional Maternal and Child nutrition information (data**) Discuss the trend of maternal , neonatal and child nutrition data shown by NDHS in Nepal and compare with neighboring countries
5. **Private Sector Contribution:** Explore what private sectors has been doing (e.g. producing supplementary food, to reduce Maternal, Newborn and Child health (MNCH) nutrition in Nepal or their communities.

References:

1. Sachdev, H.P.S. and Choudhary, P. (1965), Nutrition in Children-Developing Country Concerns. Cambridge Press, New Delhi
2. Baker, D.J.P. (1998), Mothers, Babies and Health in Later Life. Edinburgh, Churchill Livingstone
3. Ward, R.H.T.:Smith, S.K. Donnai, D. (eds) (1994). Early Fetal Growth Development , London , RCOG Press
4. Child Nutrition and Health : Ramesh K. Adhikari and Miriam E. Krantz
5. UNICEF IYCF Facilitator's and participating training materials (handbook)

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Nutrition & Dietetics-II (3+1)

Year	First	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	3	1	-
Course code	MND 331	Lecture hour	45	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	60	25	15	-	100	-
Pass marks	24	10	6	-	40	
Duration	3 hours	6 hours	3 hours	-	-	-

Objectives:

This course will enable the students to:

1. Understand factors affecting individual dietary requirements
2. Determine the nutritional status and disease related to individual's diet
3. Apply Nutrition Care Process in treating the patients.

Course description:

Most of the diseases could be alleviated through the balance diets and diets therapy. However, the individual's dietary requirements differ from one another and influenced by many factors such as age, sex, height, weight, cultures, social and economic background, mental and emotional state, food habits, nature of the work, individual likes and dislikes towards foods, climatic conditions, family and medical history, diseased conditions. The course includes some practical aspects of nutrition and dietetics such as determination of nutritional status and various diseased conditions related to diet.

Course No MND 331	Course details	Lecture 45 hours
	Dietary management of different diseases: a) Cardiovascular disease and Medical Nutrition Therapy: • Prevalence, etiology, pathophysiology, and dietary management • Atherosclerosis and coronary heart disease, Dyslipidemia, hypertension, heart failure b) Diabetes mellitus and Medical Nutrition Therapy (MNT) • Prevalence, types, etiology, pathophysiology,, signs and symptoms, diagnosis, treatment and dietary management: prediabetes, Diabetes c) Infections and Fever: • Nutrition and Infection, Metabolic changes during Infection, Classification and etiology of fever/infection : Typhoid, Tuberculosis, Influenza d) Hepatobiliary and pancreatic Disorders: • Physiology and functions of the Liver, Diseases of liver , etiology, Symptoms and dietary management of Infective hepatitis, Cirrhosis of liver, hepatic encephalopathy, Liver transplantation, Cholecystitis and cholelithiasis , Pancreatitis (Acute and Chronic Pancreatitis) e) Kidney disease and MNT • Physiology and function of the kidneys, Types of kidney diseases, pathophysiology, signs and symptoms, diagnosis, treatment and dietary management: Acute Kidney Injury, Chronic kidney disease, End stage Renal Disease, Nephrotic syndrome, Urolithiasis f) Cancer • Etiology, Classification, Signs and symptoms and dietary management g) HIV Aids h) Gastrointestinal diseases and Nutritional Management (Pancreatic disorders) a) Etiology, Symptoms and dietary management for acute and chronic diarrhea, b) Etiology, Symptoms and dietary management for acute and chronic constipation , peptic ulcer, Gastroesophageal Reflux Disease, Dyspepsia, Gastritis (Acute and Chronic), Diverticular disease, Malabsorption syndrome, Celiac disease, Steatorrhea, Lactose intolerance, Inflammatory bowel disease (ulcerative colitis, short bowel syndrome) , Irritable bowel syndrome	

	i) Obesity and underweight • Prevalence, Classification, Etiology, Metabolic aberrations and clicinical manifestations, dietary and lifestyle modification, Pharmacological, surgical management of obesity, Etiology, classification and dietary management of underweight j) Pulmonary disease and Nutritional management: • Etiology, Symptoms and dietary management for COPD, Asthma, Acute Respiratory Distress Syndrome, Pneumonia, Chylothorax, k) Rheumatic Disease and Medical Nutritional Therapy: • Etiology, Symptoms and dietary management for Arthritis, Gout, Systemic Lupus Erythematosus l) Critical Care and nutritional management • Special Feeding methods in Nutrition Support, Nutrition in surgery and Burns m) Diet in genetic disorders. n) Diet in hypothyroidism	
	Geriatric nutrition & diet for elderly people	
	Nutrition for Athletes • Introduction, macro and micronutrients requirements • Important micronutrients for exercise • Role of Fat as an energy source for sports and exercise • Protein and amino acid requirements • Dietary supplements and ergogenic aids (nutritional, pharmacological and physiological)	
	Diet/ Nutrition counseling process and techniques • Definition, expectation, goals; Scope and limitations • Counselling theory and approaches: Key concepts and techniques • Counselling techniques, strategies and communication • Rapport building, reflecting , acceptance, negotiation (TIPS) etc.	

Practical:

Planning, calculation and prepare diet for : diarrhea, constipation, Peptic ulcer, liver disease, diabetes mellitus, kidney disease, Cardiovascular disease, weight management, Prepare low calorie, high protein , low protein diet preparations.

1. Feeding experiments. Determination of PER, NPU.
2. Determination of energy value of food- Bomb calorimeter
3. Prepare diet plan for different diseases.
4. Study diet pattern of patients (3-5 days)
5. Design flash cards, flipchart, folders in nutritional and dietetic management
5. Conduct mock diet counselling session
6. Low calorie dietetic preparations (salads, soups, beverages and light snack) and quality evaluation.
7. Field visit to elder and children homes etc., study their diet consumption pattern, nutrition and general health related problems and prepare report.)

Textbooks:

1. Food and the Nutrition Care process by Krause 14 th edition
2. Dietetics : Sri laxshmi 8th edition
3. Clinical Dietetics and nutrition by Antia
4. Nutritive Value of Indian Foods. NIN
5. Food Composition Tables for Nepalese. DFTQC. 2012
4. (Srilakshmi B; Dietetics; New Age International (P) Ltd. Publishers, India, 2000
5. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol I; The Bangalore Printing and Publishing Co. Ltd., India, 1993
6. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol II; The Bangalore Printing and Publishing Co. Ltd., India, 1993
7. Perspectives in Nutrition 4th edition; WCB McGraw Hill Publications, 1999.
8. Nutrition Concepts and Controversies, 7th edition, Wadsworth Publishing Company, 1997
9. Dietetics by B. Srilakshmi, Eight edition .New Age International Publisher . 2019.

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Nutrition Project Planning and Project Proposal writing (2+1)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	2	1	-
Course code	MND 332	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

1. This course will enable the students to:
2. Understand how a policy is formulated
3. Identify food and nutritional problems amenable to policy intervention
4. Describe the project management cycle
5. Plan a nutrition program
6. Explain elements and steps of project planning and management
7. Manage a nutrition program
8. Monitor and evaluate a nutrition program

Course Description:

This course deals with concepts of policy planning and management of food and nutrition. Steps and dynamics of policy making processes; policies and program implementation processes; translation of policies into feasible programs, evaluation of nutritional and other impacts of policy; projects planning in food, nutrition and dietetics; project planning tools, logic model, management, leadership styles, project management cycle; project management mechanisms; public participation in policy making, program planning, implementation, monitoring and evaluation; development of project proposal.

Course No. MND 332	Course details	Lecture 30 hours
	Introduction • Definition of key terms • Planning in food, nutrition and dietetics programs/project • Why planning is essential?	
	Food and Nutrition Policy • Basics of policy formulation • Public participation policy making • Components of policy document • Uses of policy document • Translating policy into programs • Policy impacts on food and nutrition security	
	Program planning and implementation • Project planning tools e,g, problem tree analysis, objective tree analysis , stakeholder analysis, situation analysis, root cause analysis, fishbone diagram, SWOT analysis, SMART objectives, pareto chart analysis etc.; logic models and result framework etc. • Developing a basic logic model for food/nutrition & dietetics program • Program implementation timeline and activities (Gantt Chart)	
	Program and Project management • Characteristics and charter of project • Dimensions and sources of project objectives • Establishing project technical cost and schedule • Defining project work scope • Detail planning of a project • Interactive and time analysis • Resource planning • Project management mechanisms, cycle and leadership styles • Risk and opportunity management	

	Program evaluation and monitoring • Rationale and processes of M & E • Steps in M & E • Project performance measurement and management • Using logic model to plan for evaluation • Mid/end term project evaluation • Project redesign • Participatory monitoring and evaluation • Project completion and sustainability • Post implementation activities	
	Development of project proposal • Project proposal vs research and development proposal • Nature of Project proposal • Significance of project proposal • Steps of project proposal development • Nutrition project proposal writing assignment	

Practical:

1. Practical exercise on steps in planning process
2. Preparation of project proposal
3. Field visit to a nutrition project
4. Exercise on design of nutrition intervention program for a community.

Text Books:

Brown, M. L. (Ed.) Present Knowledge in Nutrition, VI Edn, International Life Sciences Institute, Nutrition Foundation, Washington D.C. 1990

Reference books:

1. Bhaskaram P. Interaction between Malnutrition and Infection in Children, in Community and Social Padiatrics. Ed. S. R. Banarjee
2. Text book of Human Nutrition, 2nd Ed., Mathab S Bamni, N. Pralhad Rao, Vinodini Reddy, Oxford & IBH Publishers Co. Pvt, Ltd., New Delhi
3. Swaminathan M; Advanced Textbook on Food and Nutrition, Vol. II; The Bangalore Printing and Publishing Co. Ltd., India.
4. Management of Sciences for Health (MSH). Managers who lead. A handbook for improving Health Services, Cambridge, Massachusetts, 2005.
5. Michael J. Gibney, Barrie M. Margetts, John M. Kearney and Lenove Arab (Editors). Public Health Nutrition, The Nutrition Society Textbook Series, Blackwell Publishing.

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Research Methodology (2+0)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	2		-
Course code	MND333	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	-	10	-	50	-
Pass marks	16	-	4	-	20	
Duration	2 hours	-	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Develop a scientific approach and know the processes of research
2. Develop the competence for selecting methods and tools appropriate for research topics
3. Understand concepts of statistical measures of central tendency, dispersion, variability and probability

Course Description:

This course will provide an opportunity for participants to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Students will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding their work, social, local and global environment.

Course No. MND 333	Course Details	Lecture 30 hours
	Research Process: • Scientific approach to enquiry in comparison to native common-sense approach • Knowledge, theory and research • Role, need and scope of research in the discipline of Nutrition Assignment: Differentiate between in investigative reporting and research report (with examples to be brought by students as exercise) Steps in Research Process and Elements of Research: • Identifying interest areas and prioritizing, Selection of topic and consideration in selection • Review of related literature and research • Variables- types of variables including discrete and continuous variables; Conceptual definitions and operational definitions • Concept s, hypothesis and theories • Hypothesis -meaning, attributes of a sound hypothesis, Stating the hypothesis and types of hypothesis, Hypothesis testing , Null hypothesis , sample distribution, level of significance, critical regions, type I and type II errors • Research Design: Research questions, objectives and assumptions Assignment: Types of variables; Hypothesis formations and research questions from Research readings students identify hypothesis/research questions- Discussion **Ethics in Research**	
	Types of Research: • Basic and Applied research, Qualitative and Quantitative research (brief review of differences) • Descriptive research methods- survey, case study, correlational study, content analysis, causal – comparative research • Analytic studies- pre-experimental, experimental research, quasi-experimental research • Qualitative research, Ethnography • Evaluative research, general characteristics, use of qualitative methods in enquiry, scope and importance in Nutrition	

	Assignment: Differentiate between a) basic and applied research (Exercise to be based on actual research papers published in accredited Journals b) qualitative and quantitative research (Exercise based on Journal contents undertake a critical appraisal of studies/research papers and discuss types of Research with examples)	
	Sampling: • Rationale, characteristics, meaning, concept of population and sample, and utility • Types of sampling and generalizability of results • Probability sampling, simple random sample, systematic random sample, stratified random sampling, random and non-random samples, random numbers and use • Non-probability sampling, purposive samples, incidental samples, quota samples, snowball samples • General consideration in determination of sample size	

Text Books:

1. Research Methodology: A Step- BY- Step Guide for Beginners: Ranjit Kumar
2. Doing Survey Research: A Guide to Quantitative Methods
3. Research Methodology by C. R. Kothari
4. Practical Research: Planning Design by Paul Leedy and Jeanne Ellis Ormrod

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Biostatistics (2+1)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	2	1	-
Course code	MND334	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives

This course will enable the students to:

a. Differentiate between parametric and non-parametric tests
b. Learn to apply statistical tests for data analysis for both large and small samples
c. Know how to interpret the results of statistical analysis of data
d. Be able to summarize data and present it using tales and graphs
e. Develop skills for preparation of research proposals
f. Understand the components of a research report

Course Description:

Introduction to Biostatistics provides an introduction to selected important topics in bio statistical concepts and reasoning. This course represents an introduction to the field and provides a surgery of data and data types. Topics include descriptive statistics, graphical data summary, and sampling statistical comparison of groups, correlation, and regression. Specific topics include tools for describing central tendency and variability in data; methods for performing inference on population means and proportions via sample data; statistical hypothesis testing and its application to group comparisons; issues of power and sample size in study designs; and random sample and other study types. While there are some formulae and computational elements to the course, the emphasis is on interpretation and concepts.

Course No. MND 334	Course details	Lecture 30 hours
	Introduction to Statistics: • Definition, conceptual understanding of statistical measures, Popular concept and misuse of statistics **Normal Distribution and its Properties:** • Normal distribution • Binomial distribution • Probability, use of normal probability tables , area under normal distribution curve • Parametric and non-parametric tests Data Management Planning for data analysis , coding of response, preparation of code book, Coding of data, Use of statistical programs: MS Excel, SPSS, STATA etc.	
	Data Analysis: 1. Quantitative analysis, descriptive statistics, inferential statistics, Uses and limitations, summation sign and its properties 2. Proportions, percentage, ratios 3. Measures of central tendency-mean, median, mode, arithmetic mean, and its uses, and range, geometric mean, weighted mean 4. Measures of dispersion variability, range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, skewness, Grouped data, frequency distribution, histogram, frequency polygons, percentiles, quartiles, tertials, ogive 5. Large and Small Sample tests and interpretation: • Z-test for single proportions and difference between proportions • Large sample test for single mean and difference between means • Small sample tests; t-test, paired t-test, F-test	
	Chi-square test and its interpretation: 1. General features, good ness of fit 2. Independence of Attributes **Correlation and Regression and its interpretation:** 1. Basic concepts 2. Linear regression and correlation coefficient Regression and Prediction 3. Rank correlation , product-moment method	

	Analysis of Variance and its interpretation: **1.** One-factor analysis of variance **2.** Two-factor analysis of variance **Design of Experiments:** 1. Completely randomized design 2. Randomized block design 3. Latin square design **4.** Factorial design	
	Presentation of Data 1. Tabulation and Organization of data; frequency distributions, cumulative frequency, distribution, contingency tables 2. Graphics for nominal and ordinal data; pie diagram, bar graphs of different types, graphs for relation between two variables, line diagram; use of illustrations, cautions in visual display of data	
	Research Report: Basic components of a research report: • Prefatory material • Introduction • Reviews of related literature • Methodology • Results • Discussion • Conclusion • Executive Summary • Abstract • Bibliography • Appendices **Students to design a research study on a topic:** ➢ Specify type of research ➢ Sample selection ➢ Protocol operationalization ➢ Tools ➢ Tests for statistical analysis **Preparation of a Research Proposal**	

Practical:

1. Introduction to computer hardware and software
2. Use of Statistical package (like MS Excel, SPSS etc) for the statistical analysis of research data
3. Demonstrate the application of the above statistical package for;

a. Frequency Distribution
b. Stem-and leaf diagram
c. Various types of graphs
d. Mean, Geometric mean
e. Median, Quartiles Deviation , Mean deviation
f. Standard Deviation, variance, coefficient of variation
g. Skewness and Kenosis
h. Chi-square testing
i. One -way ANOVA
j. Two-way ANOVA
k. Linear Regression
l. Multiple Linear Regression
m. logistic regression

4. Select three nutrition and diet related research published articles and critically review the application of statistical analysis used in the research.

Reference Reading Materials:

1. Introduction to Statistical Theory Part II by Sher Muhammad and Dr. Shahid Kamal
2. Statistical Methods and Data Analysis by Dr. Faquir Muhammad
3. Essential of Biostatics in Public Health. (2017) by Lisa M. Sullivan; Third Edition
4. Biostatistics : a manual of statistical methods for use in health , nutrition and anthropology by K. Visweswara Rao, Paypee Brothers Publication 2007
5. Statistics in Nutrition and Dietetics by Michael Nelson 2020
6. Biostatistics : Basics Concepts and Methodology for the Health Sciences by Wayne W. Daniel, Chad L. Cross 10th Ed, 2014
7. Yule G.V. and Kendall;"Elementary Theory of Mathematical Statics", Charles Giffins & Co., London
8. Issac, S. and Michael, W.B., Handbook in Research and Evaluation, San Diego, CA:EDITS Publication

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Nutrition & Epidemiology (2+1)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	2	1	-
Course code	MND 335	Lecture hour	30	-	-

Examination system	Final		Internal assessment		Total marks	Remarks
	Theory	Practical	Theory	Practical		
Full marks	40	25	10	-	75	-
Pass marks	16	10	4	-	30	
Duration	2 hours	6 hours	2 hours	-	-	-

Objectives:

This course will enable the students to:

1. Introduce newly emerging topics and issue in nutrition epidemiology and dispose a great impact on human health
2. Demonstrate that nutrient and non-nutrients statistical evaluation of Nepalese population and use it for control planning
3. Encourage students for creation of knowledge in nutrition, biochemistry, public health for understanding human health problem.

Course description:

This course will introduce the foundations and principles of epidemiology and applied biostatistics to design, conduct and analyze clinical, population-based environmental, and methodological nutrition and health-related research. The students will learn to design and analyze experimental and observational studies covering etiology, interventions, diagnosis, and prognosis. The course focuses on learning research skills in disease outbreak investigation, prevention, and control, and applied research methods in investigating the causal relationship between nutrition and infectious as well as non-communicable diseases (NCD). The student will use cases of diseases to practice learning epidemiological studies.

Course No MND 335	Course details	Lecture 30 hours
	Introduction: • Concept of epidemiology and importance in planning and intervention for prevention and control of nutrition related problems.	
	Principles of Epidemiology: • Concept of epidemiology and importance in planning and intervention for prevention and control of nutrition related problems.	
	Nutritional Epidemiology: • Relation of diet and nutrition on chronic diseases, diet and nutritional indicators as etiologic factors in diseases, nutritional problems in which epidemiological studies are feasible.	
	Nutrition Epidemiology of Protein Energy Malnutrition (PEM)	
	Nutrition epidemiology of obesity and diabetes I and II • Population data on obesity, factors affecting obesity and dietary factors of obesity.	
	Nutrition epidemiology of Cardiovascular diseases • Role of diet for the onset of cardiovascular diseases and establishing the casual factors including dietary factors of these diseases.	
	Nutrition epidemiology of Micronutrient deficiencies • Role of diet on micronutrient deficiencies such as vitamin A deficiency, Iron deficiency, Anemia, Iodine deficiency disorder, their etiological factors population data and casual factors.	

	Nutrition epidemiology of Cancer • Role of diet on cancer, collection of data on cancer and establish the role of nutrition and diet on prevention and control of cancer	
	Nutrition epidemiology of Cancer osteoporosis • Calcium intake and osteoporosis among the elderly especially of women, the existing population data need of data base on calcium deficiency and consumption of calcium rich foods	
	Nutrition epidemiology of iron deficiency • Etiological factors of iron deficiency anemia, the role of diet and nutrition, population data on iron deficiency	
	Nutrition epidemiology of chronic Kidney diseases: • Etiological factors of kidney diseases, population data on the prevalence of kidney diseases.	

Practical:

1. Epidemiological study of PEM in Nepal
2. Epidemiological study of obesity in Nepal
3. Preparation of individual reports and presentation on different nutritional epidemiological research finding in Nepal and around the world.

Text books:

1. Willet W. Nutritional Epidemiology (2nd edition) New York : Oxford University Press, 1998
2. An introduction to epidemiology, K.J Rothman

Reference books:

1. Nutritional Epidemiology (Monograph in Epidemiology and Biostatics) Hardcover- November 7,2012 by Walter Willet (Author)
2. Margetts BM, Nelson M. Design Concepts in Nutritional Epidemiology. New York: Oxford University Press, 1997.
3. Hu F. Obesity Epidemiology. New York: Oxford University Press, 2008.
4. Margetts BM, Nelsion M. Design Concepts in Nutritional Epidemiology. New York: Oxford University Press.

M.Sc. Nutrition and Dietetics

Third Semester

Subject: Nutrition and Dietetics Class Seminar I (0+1)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Third	Credit hour	-	1	-
Course code	MND 336	Lecture hour	-	-	-

Examination system	Final	Total marks	Remarks
	Evaluation, Report and Presentation		
Full marks	25	25	
Pass marks	10	10	

Objectives and course description:

- The class seminar is intended to provide students with an opportunity to enhance their knowledge of specific aspects of nutrition, public health, develop new skills, and apply knowledge and skills acquired through the program course work. If necessary, another faculty member or field mentor with subject expertise will be assigned as a student advisor/guide for the duration of the seminar .
- The purpose the first seminar is to provide students practice speaking in front of a scientific audience and to explore topics in detail. Students should research topics and organize presentations for faculty and other students. The topics may be any aspect of the nutrition and dietetics and must be approved by the instructor in advance. Unless cleared with the instructor, students may not give a presentation. The student's presentation title should not be similar to one they have delivered in another class. To help students improve their presentation skills, each student will receive feedback from the fellow students and the instructor. After seminar, the students should arrange a time to meet with their instructors to discuss their performance

On this subject student will be delivering **two** class seminars:

a) Class seminar on General topic &

b) Class seminar on Specific topic.

For class seminar on general topic, students must provide the topic of seminar fifteen days before the commencement of seminar to the college department as per the notice issued by the college on the same. The seminar will be evaluated in presence of a research committee member and program coordinator.

The seminar for specific topic must be related to student's research topic. As per the date affixed by the college department, student must compulsorily present the paper in presence of his/her thesis supervisor, research committee member and program coordinator and evaluated accordingly.

Expectations:

It is mandatory that each student must participate in all seminars. All students must attend each seminar. In addition, students are Expected actively participate by asking questions to the presenter. Failure to meet deadlines of submission will also be taken into account in final grading. Students should submit a hard copy of their topic description to the instructor. At that time students will submit a tentative title, a paragraph or two describing the topic, as well as several pertinent references. (5 is sufficient).

Choose to use PowerPoint to present their seminar available. It is students' responsibility to arrange for any equipment you require. Visual aids should look professional and be readable in the entire room. Explain concepts simply and clearly, and define all terms and acronyms. Be prepared to answer questions after your seminar. The seminar will be timed and should not be more than the allotted minutes.

Students will submit a detailed outline of their presentation and also brief abstract (one two paragraphs, 250 words) describing their presentation. A draft of the seminar will be submitted a day prior the presentation. The final draft of student's presentation must be distributed electronically to all department faculty prior to their seminar.

The final grade of the students will be determined by several factors like the quality and content of your seminars, improvement, participation and their ability to meet scheduled deadlines

Mandatory Reading:

1. Benett, B.2001. The three P's of scientific talks; Preparation, practice and presentation. Society for Economic Botancy Newsletter, 15: 6-9
2. Online at :http://www.econbot.org/webmaster/pubs_p&p/issues/2001_spring.pdf

M.Sc. Nutrition and Dietetics

Fourth Semester

Subject: Internship in Public and Private Organizations, Hospitals and Communities (0+2)

Year	Second	Teaching schedule (Hours)	Lecture (Theory)	Practical	Tutorial
Semester	Fourth	Credit hour	-	2	-
Course code	MND 441	Lecture hour	-	-	-

Examination system	Final	Total marks	Remarks
	Evaluation, Report and Presentation		
Full marks	50	50	
Pass marks	20	20	

Objectives:

The subject Nutrition and Dietetics is directly related to patients in hospitals and disease prevalent in community. So, the aim of the course is to provide a sound practical knowledge thereby making students capable to identify and solve the dietary and health issues. For this, hospital/community internship is an essential requirement.
The duration of internship is full two months. Each student must submit his/ her internship report to the department of Nutrition and Dietetics after the completion of their internship. The intern (Student) will be under direct supervision of his/her supervisor of the concerned hospital/ community and evaluated as per his/her performance in the evaluation form prescribed by the department of nutrition and dietetics of the college.

M.Sc. Nutrition and Dietetics
Fourth Semester

Subject : Nutrition and Dietetics Class Seminar II (0+1)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Fourth	Credit hour	-	1	-
Course code	MND 442	Lecture hour	-	-	-

Examination system	Final	Total marks	Remarks
	Evaluation, Report and Presentation		
Full marks	25	25	
Pass marks	10	10	

Objectives:

The class seminar is intended to provide students with an opportunity to enhance their knowledge of specific aspects of nutrition, public health, develop new skills, and apply knowledge and skills acquired through the program course work. If necessary, another faculty member or field mentor with subject expertise will be assigned as a student advisor/guide for the duration of the seminar .

Course Description:

On this subject student will be delivering two class seminars:
Class seminar on Research topic &
Class seminar on selected topic for thesis.

For class seminar on Research topic, students must provide the topic of seminar fifteen days before the commencement of seminar to the college department as per the notice issued by the college on the same. The seminar will be evaluated in presence of a research committee member and program coordinator.The seminar on selected topic for thesis must be related to student's research topic. As per the date affixed by the college department, student must compulsorily present the paper in presence of his/her thesis supervisor, research committee member and program coordinator and evaluated accordingly.

The **Class Seminar II /Thesis proposal seminar** topic must be related to student's thesis research topic. As per the date affixed by the college department, student must compulsorily present the paper in presence of his/her thesis supervisor, research committee member and program coordinator and evaluated accordingly. After approval of the thesis seminar proposal students will be allowed to carry out the research field activities.

You may give a proposal seminar once during your M.S. program. The time you choose to do this is up to you and your thesis committee. Usually this will be in the second or their semester.

Before students select the topic of their thesis proposal, they should have thoroughly studied the background and methods of at least 10 research articles published in nationally and internationally recognized Journals. Then the students should develop thesis proposal in consultation with the thesis advisor. Students do not need to have all your data collected, but it is usually helpful to have some preliminary work already accomplished.

Students should discuss with their advisor and present the proposal to thesis committee. If the thesis committee does not feel the student is ready, then you should revise it including committee comments and suggestions and then present it again.

Proposes seminar format:

- Introduce your advisor, and committee members (who should be in attendance)
- Brief description of the process of reference research articles (10 published)
- Justify your research topic (title) with references; relevant to present situation, important, innovative etc.
- Give an introduction and background from references on your topic. What relevant research has chosen
- Describe the methodology you will use to test your hypotheses/research questions. Be sure you fully understand your chosen methods. Give reasons why you chose these methods over other approaches
- Present any data you have collected thus far
- Describe what remains to be done, and what you expect to find
- Explain the significance of your findings (or potential future findings)
- significance of your findings (or potential future findings)

M.Sc. Nutrition and Dietetics

Fourth Semester

Subject: Nutrition and Dietetics Research (Thesis Work) (0+16)

Year	Second	Teaching schedule (hours)	Lecture (theory)	Practical	Tutorial
Semester	Fourth	Credit hour	-	16	-
Course code	MND 443	Lecture hour	-	-	-

Examination system	Final		Total marks	Remarks
	Internal Examiner 60%	External Examiner 40%	Total 100 %	
Full marks	240	160	400	-
Pass marks	96	64	160	

Objectives:

This course will enable the students to:

- Demonstrate an advanced knowledge of nutrition & health, at biological, social and policy levels; assess critically, select and apply a range of appropriate research skills and techniques, from anthropometry and information on dietary intake to broader analytical skills
- Interpret and synthesize different types of data used to analyze and assess nutritional problems at population and population sub-group levels
- Evaluate critically the findings of scientific studies of nutrition; disseminate and present findings of research in a range of formats and contexts.
- Identify and formulate appropriate responses and intervention strategies to address nutritional issues, taking into account the Human nutrition, public health and social policy contexts, and apply knowledge of effective teamwork and communication skills to solve problems and achieve goals.

Course Details:

The students will carry out thesis works on the topic approved from the department within the duration of one semester. The department will decide the schedule for the submission of the thesis and for the final examination / presentation.

The thesis writer should care:

1. Topics: Nutrition and Dietetics in general; public health; Health & nutrition education.
2. Content, which includes the introduction; thesis, hypothesis, or research questions; literature review and synthesis; data collection and analysis; implications; recommendations; and conclusions.

3. University Guidelines, including the title page, abstract, level headings, tables, charts, citations, quotations, and references.
4. Scholarly Style, such as grammar; word use; sentences that are active, clear, complete, concise, interesting, and relevant; smooth transitions for flow; and scholarly tone.
5. Defense and Post-Defense Preparations, which includes preparations for the defense presentation, questions/answers period, post-defense manuscript preparation and review, and professional presentation preparation from abstract submission to presentation.

QUESTION FORMAT (FINAL THEORY EXAM)

Course No. (3+1)				**Time 3 Hours**
Question Type	Total Questions	Question to be solved	Marks/Question	Total Marks
Long Question	4	3	10	30
Short Question	6	5	1	5
Short Notes	6	5	5	25

Credits Hour (2+1)				**Time 2 Hours**
Question Type	Total Questions	Question to be solved	Marks/Question	Total Marks
Long Question	3	2	10	20
Short Question	6	5	1	5
Short Notes	4	3	5	15

Credits Hour (2+0)				**Time 2 Hours**
Question Type	Total Questions	Question to be solved	Marks/Question	Total Marks
Long Question	3	2	10	20
Short Question	6	5	1	5
Short Notes	4	3	5	15