BP801T. BIOSTATISITCS AND RESEARCH METHODOLOGY (Theory)

Credit Points	**04**	**Total Teaching Hours**	**45**
No. of lectures per week	**03**	**No. of tutorials per week**	**01**

Scope:

To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non-Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives:

Upon completion of the course student shall be able

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems..

Course Content:

Unit I	**Introduction:** Statistics, Biostatistics, Frequency distribution Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples **Measures of dispersion:** Dispersion, Range, standard deviation, pharmaceutical problems **Correlation:** Definition, Karl Pearson's coefficient of correlation, Multiple correlation pharmaceuticals examples	**10 hours**
Unit II	**Regression:** Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a+by, Multiple regression, standard error of regression– Pharmaceutical Examples **Probability:** Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties- problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM)- Pharmaceutical examples **Parametric test:** t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference	**10 hours**
Unit III	**Non Parametric tests:** Wilcoxon Rank Sum Test, Mann-WhitneyU test, Kruskal-Wallis test, Friedman Test.	**10 hours**

	Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism **Graphs:** Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph **Designing the methodology:** Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.	
Unit IV	Blocking and confounding system for Two-level factorials **Regression modeling:** Hypothesis testing in Simple and Multiple regressionmodels **Introduction to Practical components of Industrial and Clinical Trials Problems:** Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R Online Statistical Software's to Industrial and Clinical trial approach	**08 hours**
Unit V	**Design and Analysis of experiments:** **Factorial Design**: Definition, 22, 23 design. Advantage of factorial design Response Surface methodology: Central composite design, Historical design, Optimization Techniques	**07 hours**

Suggested Readings: (Latest Editions)

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.

2. Fundamental of Statistics– Himalaya Publishing House- S.C.Guptha

3. Design and Analysis of Experiments–PHI Learning Private Limited, R. Pannerselvam,

4. Design and Analysis of Experiments– Wiley Students Edition, Douglas and C. Montgomery

Course Description

Name of the Course: Biostatistics and research methodology	
Course Code: BP801 T	Semester: VIII B. Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP801T 1	Apply the concept of measures of central tendency, dispersion and correlation for solving pharmaceutical problems.
BP801T 2	Utilize the concept of regression, probability, sampling and solve pharmaceutical problems using parametric and non-parametric tests.
BP801T 3	Select suitable research methodology for testing in experimental studies by applying appropriate software to industrial and clinical trial approaches.
BP801T 4	Apply suitable optimization technique for design and analysis of experiments.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP801T **1**	1	2	2	1	-	-	-	-	-	-	3
BP801T **2**	1	2	2	1	-	-	-	-	-	-	3
BP801T **3**	2	3	2	2	1	1	1	1	1	1	3
BP801T **4**	2	3	2	2	1	1	-	-	-	-	3

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP802T SOCIAL AND PREVENTIVE PHARMACY (Theory)

Credit Points	**04**	**Total Teaching Hours**	**45**
No. of lectures per week	**03**	**No. of tutorials per week**	**01**

Scope:

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:

Upon completion of the course student shall be able

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues.

Course Content:

Unit I	**Concept of health and disease**: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick. **Social and health education**: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, **Malnutrition and its prevention**. Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health **Hygiene and health**: personal hygiene and health care; avoidable habits	**10 hours**
Unit II	**Preventive medicine:** General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse	**10 hours**
Unit III	National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse	**10 hours**

	polio programme.	
Unit IV	National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program	**08 hours**
Unit V	Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school	**07 hours**

Suggested Readings: (Latest Editions)

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications

2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications

3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications

4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications

5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.

6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended Journals:

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

Course Description

Name of the Course: Social and Preventive Pharmacy	
Course Code: BP802 T	Semester: VIII B. Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP802T 1	Acquire high consciousness/ realization of current issues related to health and pharmaceutical problems within the country and worldwide.
BP802T 2	Have a critical way of thinking based on current healthcare development.
BP802T 3	Evaluate alternative ways of solving problems related to health and pharmaceutical issues.

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP802T **1**	3	1	2	1	1	1	2	3	3	2	2
BP802T **2**	2	2	2	1	2	1	3	2	2	1	2
BP802T **3**	1	2	3	1	1	1	2	2	2	1	2

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP 809 ET. COSMETIC SCIENCE (Theory)

Credit Points	**04**	**Total Teaching Hours**	**45**
No. of lectures per week	**03**	**No. of tutorials per week**	**01**

Scope:

This subject is designed to impart basic knowledge on the area of Novel Drug Delivery Systems.

Objectives:

Upon completion of the course student shall be able

- To understand various approaches for development of Novel Drug Delivery Systems.
- To understand the criteria for selection of drugs and polymers for the development of Novel Drug Delivery Systems, their formulation and evaluation.

Course Content:

Unit I	Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs **Cosmetic excipients:** Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application **Skin**: Basic structure and function of skin. **Hair**: Basic structure of hair. Hair growth cycle. **Oral Cavity:** Common problem associated with teeth and gums.	**10 hours**
Unit II	**Principles of formulation and building blocks of skin care products:** 10 Hours Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages.Application of these products in formulation of cosmecuticals. **Antiperspants & deodorants**- Actives & mechanism of action. **Principles of formulation and building blocks of Hair care products:** Conditioning shampoo, Hair conditioner,anti-dandruff shampoo. Hair oils. Chemistryand formulation of Para-phylene diamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash**.**	**10 hours**
Unit III	Sun protection, Classification of Sunscreens and SPF. **Role of herbs in cosmetics**: Skin Care: Aloe and turmeric Hair care: Henna and amla. Oral care: Neem and clove **Analytical cosmetics**: BIS specification and analytical methods for shampoo, skin cream and toothpaste	**10 hours**

Unit IV	**Principles of Cosmetic Evaluation**: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps,and syndet bars. Evolution and skin benfits.	**08 hours**
Unit V	Oily and dry skin, causes leading to dry skin, skin moisturization. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and bodyodor. Antiperspirants and Deodorants- Actives and mechanism of action.	**07 hours**

Suggested Readings: (Latest Editions)

1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.

2) Cosmetics– Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.

3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.

Course Description

Name of the Course: Cosmetic Science	
Course Code: BP809ET	Semester: VIII B. Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP809ET 1	Apply the knowledge gained in Structure & function of skin, hair & oral cavity
BP809ET 2	Explain the Principles & building blocks of cosmetic formulations
BP809ET 3	Describe the Role of herbs & excipients in cosmetics
BP809ET 4	Outline the Analytical methods & problems associated with cosmetics

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP809ET **1**	3	1	3	3	2	3	3	1	3	3	2
BP809ET **2**	3	3	2	3	1	2	2		2		3
BP809ET **3**	3	-	1	3	3	3	3	3	3	3	3
BP809ET **4**	3	2	1	3	1	3	3	3	3	1	3

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high

BP812ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS (Theory)

Credit Points	04	Total Teaching Hours	45
No. of lectures per week	03	No. of tutorials per week	01

Scope: This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

Objectives:

Upon completion of the course student shall be able to:

1. Understand the need of supplements by the different group of people to maintain healthy life.
2. Understand the outcome of deficiencies in dietary supplements.
3. Appreciate the components in dietary supplements and the application.
4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

Course Content:

Unit I	Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds	**07 hours**
Unit II	Phytochemicals as nutraceuticals: Occurrence and characteristic features(chemical nature medicinal benefits) of following A) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, leutin B) Sulfides: Diallyl sulfides, Allyl trisulfide. C) Polyphenolics: Reservetrol D) Flavonoids- Rutin , Naringin, Quercitin, E) Anthocyanidins, catechins, Flavones F) Prebiotics / Probiotics.: Fructo oligosaccharides, Lacto bacillum	**15 hours**

	G) Phyto estrogens : Isoflavones, daidzein, Geebustin, lignans H) Tocopherols I) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.	
Unit III	A) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids. B) Dietary fibres and complex carbohydrates as functional food ingredients	**07 hours**
Unit IV	Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing. Antioxidants: Endogenous antioxidants– enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, α-Lipoic acid, melatonin Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole. Functional foods for chronic disease prevention	**10 hours**
Unit V	Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals. Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods. Pharmacopoeial Specifications for dietary supplements and nutraceuticals	**06 hours**

Recommended Books: (Latest Editions)

1. Dietetics by Sri Lakshmi
2. Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPunblication.
3. Advanced Nutritional Therapies by Cooper. K.A., (1996).
4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).
5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997).
6. Gibson and C.williams Editors 2000 Functional foods Woodhead Publ.Co.London.
7. Goldberg, I. Functional Foods. 1994. Chapman and Hall, New York.
8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf Life Testing in Essentials of Functional Foods M.K. Sachmidl and T.P. Labuza eds. Aspen Press.

9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
10. Shils, ME, Olson, JA, Shike, M. 1994 Modern Nutrition in Health and Disease. Eighth edition. Lea and Febiger

Course Description

Name of the Course: Dietary Supplements and Nutraceuticals	
Course Code: BP812ET	Semester: VIII B.Pharm.
Teaching hours: 45 hours	Maximum marks: Theory: 100
Teaching scheme: L-T: 3-1	
Examination scheme: Internal test: 15 Marks End Semester exam: 75 marks CAS: 10 marks Total: 100 marks	Examination duration: Theory: 03 hours

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

CO No.	COURSE OUTCOMES
BP812ET1	Explain the health benefits of nutraceuticals and Dietary supplements .
BP812ET2	Explain the chemistry and functions of phytochemicals as nutraceuticals Aware of the outcome of deficiencies in dietary supplements.
BP812ET3	Describe the generation of free radicals and their role in tissue damage. Explain the role of natural antioxidants in preventing the free radical mediated diseases
BP812ET4	Describe the function of regulatory authorities (FSSAI, FDA, FPO, MPO, AGMARK. HACCP) in maintaining the safety aspects of neutraceticals

Course Articulation Matrix: Mapping of COs with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
BP812ET1	3	-	-	-	-	-	-	-	3	3	3
BP812ET2	3	-	-	-	-	-	-	-	3	3	3
BP812ET3	3	-	-	-	-	-	-	-	3	3	3
BP812ET4	3	3	-	3	2	-	3	-	3	3	3

PO1: Pharmacy Knowledge, PO2: Planning Abilities, PO3: Problem analysis, PO4: Modern tool usage, PO5: Leadership skills PO6: Professional identity, PO7: Pharmaceutical ethics, PO8: Communication, PO9: Pharmacist & society, PO10: Environment & sustainability, PO11: Life-long learning.

Degree of compliance: 1-low 2-medium 3- high