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# **SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES**

**BOARD OF STUDIES MEETING(BOS) & SYLLABUS**

**Department/Program-Pharmacy/PhD**

**2017-18 TO 2021-22**

[www.sssutms.co.in](http://www.sssutms.co.in)

Opp.Oilfed Plant, Bhopal-Indore Road,Sehore (M.P), Pin - 466001



(+91) 07562-292740 | 7562292720



**Sri Satya Sai University of Technology and Medical Sciences, Sehore**  
**Faculty of Pharmacy**  
**Minutes of Board of studies Meeting**

A Meeting is call on dated September 28, 2021 at Principal/Dean cabin in Faculty of Pharmacy, SSSUTMS. The agenda of meeting is for Approval and Update of SYLLABUS OF Ph.D. COURSE WORK Syllabus for Pharmacy Course.

Following faculty members were present

Dr. Alok Kumar Shukla (Subject Expert) — *Alok*  
Dr. Ashish Dixit (Subject Expert) — *Ashish*  
Dr. Neelesh Chaubey (Chairman) — *Neelesh*  
Dr. Hemant Sharma (Member) — *Hemant*  
Dr. C.K. Tyagi (Member) — *C.K. Tyagi*  
Mr. Harish Pandey (Member) — *Harish*  
Dr. Sunil Shah (Member) — *S.S.*  
Mr. Narendra Patel (Member) — *N.P.*  
Mr Jitendra Sigh Lodhi (Member) — *J.L.*  
Mr. Pradeep Patra (Member) — *P.P.*  
Mr. Yogendra Malviya (Member) — *Y.M.*  
Mr. Firoz Khan (Member) — *F.K.*  
Mr.Dinesh Somwanshi (Member) — *D.S.*  
Mr.Dharmendra Siloriya (Member) — *D.S.*  
Mrs. Sujata Kushwaha (Member) — *S.K.*  
Miss Deepshikha Gunwan (Member) — *D.G.*  
Miss Sana Sahil (Member)

As per the STATUTE- 19 of SSSUTMS, Sehore Board of Studies of Faculty of Pharmacy Framed syllabus and Comprise it.

At the end thanks to all the faculty members, Minutes of meeting and Copy Syllabus is forwarded to the Academic Council for further Approval.

*[Signature]*  
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# SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCES  
SEHORE (MP)



## Research Methodology

Ph.D. Course Work (I) Syllabus

  
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## Research Methodology

### Unit I:- Research Foundation:

Evolution of scientific inquiry and Research, definition, characteristics , types and objectives of Research, importance of Research methodology in scientific Research. Selection and formulation of Research problem. Research design: meaning of Research design, features of good research design , inductive, deductive, and development of models.

Hypothesis: Different types and significance, development of working Hypothesis, Null Hypothesis.

### Unit II: - Review of Literature:

Meaning and Significance of review of literature, literature search procedure , sources of literature: primary and secondary sources, web source, critical literature review , Review Quality Instrument(RQI) .

### Unit-III:- Data Collection And Analysis:

**Data Collection** Sources of data – primary, secondary and tertiary Types of data- categorical, nominal and ordinal methods of data collection: observations, field investigations, Direct studies: reports, record, or experimental observations.

**Data analysis:** graphical representation, descriptive analysis, inferential analysis, correlation analysis and regression analysis. Measure of central tendency, measure of dispersion, measure of variation, Measure of central tendency vs measure of dispersion, normal distribution, measure of skewness and interpretation, purpose and use of chi-square test. Data analysis by using statistical software's: MATLAB, MINITAB and SPSS. Hypothesis Testing, generalization, interpretation and modeling.

### Unit IV :- Scientific Writing And Ethics:

**Scientific Writing:** Structure and components of research paper and thesis writing. Different steps in the preparation: Layout, structure, language, illustrations, tables, citation styles and Bibliography.

**Ethics:** Ethical issue, Ethical committees, commercialization, copy right , royalty, intellectual property, rights and patent laws, plagiarism, citation, acknowledgement, Reproducibility and accountability

  
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**Unit-V:- Computer Applications and Statistics:**

**Computer Applications** Application of computer in research, M.S. Office and its applications. Internet and its applications: E-mail, www, Web browsing, acquiring technical skills, drawing inferences from data.

**Statistics** Introduction to Statistics - Probability Theories - Conditional Probability, Poisson distribution, Binomial Distribution and Properties of Normal Distributions, Estimates of Mean, mode, median and Proportions.

**References:**

1. Kothari, C.R.(2008). Research Methodology: Methods and Techniques. Second Edition New Age International Publishers, New Delhi.
2. Sinha, S.C. and Dhiman, A.,2002. Research Methodology, Ess Ess Publications.2 volumes.
3. Gupta S.P. (2008). Statistical Methods. 37<sup>th</sup>ed. (Rev)Sultan Chand and Sons.New Delhi. 1470 p.
4. Leon & Leon (2202). Internet for everyone, Vikas Publishing House.
5. Wadehra, B.L.2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.
6. Research Methodology Dr PM Bulakh,Dr P. S. Patki and DrAS Chodhary 2010Published by Expert Trading Corporation Dahisar West, Mumbai 400068
7. Statistical method for Research works by fisher R.A. Cosmo publication, New Delhi ISBN : 81-307-0128-6
8. Design and analysis of experiments by montgomery D.C., john wiley ,ISBN: 0471260088
9. MINITAB online manual
10. Methodology of Research in Social Science by O.R. Krishnaswamy and Rangnatham, Himalaya Publication Hore, ISBN: 8184880936
11. SPSS online manual.

  
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**SUBJECT SPECIALIZATION-I**

**SUBJECT: PHARMACY**

**UNIT-I**

Pharmaceutical Analysis: UV- Visible spectroscopy and Infra-Red Spectroscopy, Its Pharmaceutical applications. Chromatography: Basic Principle instrumentation, Methodological Techniques and Quantitative Analysis of drugs and their Metabolites using Column, Paper chromatography, TLC, GC, HPLC and HPTLC.

Medicinal Chemistry: Structure, nomenclature, classification, synthesis, SAR and metabolism of the following category of drugs, Hypnotics and Sedatives, Analgesics, NSAIDS. Neuroleptics, Antidepressants, Anxiolytics, Anticonvulsants, Antihistaminics, Local Anaesthetics, Cardio Vascular drugs, Hypoglycemic agents, Antilipidemic agents, Coagulants, Anticoagulants, Antiplatelet agents. Chemotherapeutic agents.

Biochemistry: Biochemical role of hormones, Vitamins, Enzymes, Nucleic acids, Bioenergetics, General principles of immunology. Immunological, Metabolism of carbohydrate, lipids, proteins.

**UNIT-II**

Drug Regulatory Affairs: Indian Patent Act 1970, its amendments, concepts of IPR, criteria for granting patents and filing a Indian patent, PCT, Patent infringement. INDA/NDA/ANDA filing. Para I, II, III, IV filing. Hatch-Waxman amendments. Introduction to Patent Search. OECD guidelines for chemical testing pertaining to use as drug, related substances, excipients, toxicity, etc. WHO guidelines for standardization of raw material and finished products including herbal products.

Pharmaceutical Jurisprudence : Drugs and cosmetics Act and rules with respect to manufacture sales and storage. Pharmacy Act, Pharmaceutical ethics.

**UNIT -III**

Natural Products : Pharmacognosy and Phytochemistry – Chemistry, tests, isolation, characterization and estimation of phytopharmaceuticals belonging to the group of Alkaloids, Glycosides, terpenoids, Steroids, Bioflavanoids, Purines, Guggul lipids. Pharmacognosy of crude drugs that contain the above constituents. Standardization of raw materials and herbal products. WHO guidelines. Quantitative microscopy including modern techniques used for evaluation. Biotechnological principles and techniques for plant development, Tissue culture.

  
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#### UNIT-IV

Microbiology: Principles and methods of microbiological assays of the Pharmacopoeia. Methods of preparation of official sera and vaccines. Serological and diagnostics tests. Applications of microorganisms in Bio Conversions and in Pharmaceutical industry.

Pharmacology: General pharmacological principles including Toxicology, Drug interaction, Pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastrointestinal system and Respiratory system. Pharmacology of Autocoids, Hormones, Hormone antagonists, chemotherapeutic agents including anticancer drugs. Bioassays, Immuno Pharmacology. Drugs acting on the blood and blood forming organs. Drugs acting on the renal system.

Clinical Pharmacy: Therapeutic Drug Monitoring Dosage regimen in Pregnancy and Lactation, Pediatrics and Geriatrics. Renal and hepatic impairment. Drug – Drug interactions and Drug – food interactions, Adverse Drug reactions, Medication history, interview and Patient counseling.

#### UNIT-V

Pharmaceutics: Formulation and Evaluation of tablets, capsules, liquids, semisolid, ophthalmic and parenteral preparations. Stability testing of pharmaceutical dosage form as per ICH guidelines. Biopharmaceutics and Pharmacokinetics and their importance in formulation. Formulation and characterization of cosmetics – lipstick, shampoo, creams, nail preparations and dentifrices and Pharmaceutical calculations.

#### References:

1. Instrumental Methods of Chemical Analysis by B.K Sharma.
2. Text book of Pharmaceutical Analysis by Kenneth A. Connors.
3. Spectrophotometric identification of Organic Compounds by Silverstein
4. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7 th April available at <http://en.wikipedia.org/wiki/RegulatoryAffairs>.
5. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
6. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
7. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
8. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
9. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
10. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.

  
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11. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
12. Foye's Principles of Medicinal Chemistry.
13. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B. Schwartz
14. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005.
15. Text book of Forensic Pharmacy by B.M. Mithal .
16. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
17. Principles of Biochemistry by Lehninger.
18. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
19. Robert GCK, ed., "Drug Action at the Molecular Level" University Park Press Baltimore.
20. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice essential concepts and skills, 1<sup>st</sup> ed. Chennai: Orient Longman Private Limited; 2004.



  
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Ph.D. COURSE WORK

Course – II- PHARMACY

**UNIT-I**

Preformulation studies: Study of physical, chemical and pharmaceutical factors influencing formulation of drugs. Study of formulation additives, Drug –Excipient, Excipient - Excipient interactions and Incompatibilities.

**UNIT-II**

Drug Selection, Measurement of serum drug concentration, Monitoring dosing, Determination of dose frequency, Dosing of drugs in elderly.

**UNIT-III**

Bioavailability and bioequivalence. In vitro-in vivo testing of drugs. Cell lines and their uses. Limitations of in vitro testing of drugs.

**UNIT-IV**

Stability Studies: - Stability study programmes for formulations. Determination of Expiry date (shelf life) and Overage calculations. Stability indicating assays and ICH guidelines for stability.

**UNIT-V**

Regulations for laboratory animal care and ethical requirements. CPCSEA guidelines for performing experiments on animals. Alternatives to animal studies

**References:**

1. A Owunwonne, Handbook of Radiopharmaceuticals, Narosa Publishing House, New Delhi.
2. Ansel H C, Introduction to Pharmaceutical Dosage Forms, K M Varghese & Co., Bombay. Aulton M E Pharmaceutics - The Science of Dosage Form Design, ELBS/Churchill Livingstone
3. Avis K E, Lachman L and Lieberman H A, Marcel Dekker Inc. Pharmaceutical Dosage Forms; Parenteral Medications, Vols. 1& 2, NY.
4. Badger W L and Banchemo J T, Introduction to Chemical Engineering McGraw Hill International Book Co., London

  
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5. Remington's The science and Practice of Pharmacy, Mack Publishing Co. Easton, Pemsybrania.
6. Hassan William E, Hospital Pharmacy, Lea & Febiger, Philadelphia
7. Jain N K A Text Book of Forsenic Pharmacy, Vallabh Prakashan, Delhi.



  
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