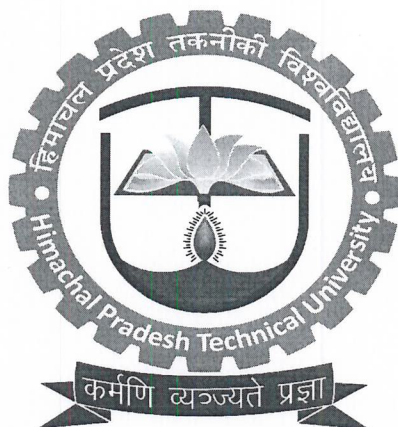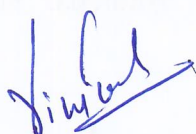# COURSE WORK AND SCHEME OF EXAMINATION FOR

Ph. D IN PHARMACEUTICAL SCIENCES

HIMACHAL PRADESH TECHNICAL UNIVERSITY, HAMIRPUR 177001 (H.P.)

Ph. D Course Work (Pharmaceutical Sciences)

Sub Code	Paper	Credit
SEMESTER-I		
PHDP-101	Research Methodology	3
PHDP-102	Computer Application	3
PHDP-103	Research and Publication Ethics (RPE)	2
SEMESTER-II		
PHDP-201.	Review of literature/ Seminars/other academic activities	4
PHDP-202.	Course Work Viva-voce	4
Total Credit		**16**

PHDP-101   RESEARCH METHODOLOGY

Theory: 60

Internal Assessment: 40 Marks (Presentation: 10, Assignment : 20, Discussion : 10)

Teaching Scheme			Credits	Marks		Duration of End Semester Examination
L	T	P	C	End Semester Exam	Total	
3	0	0	3	60	60	3 hours

Instruction to Examiner: Student will attempt any five questions. Question no 1 is compulsory and having objective questions, every question carry equal marks. Examiner are instruct to frame questions from Each Unit.

Unit 1 Introduction to research methodology: Meaning of research, objectives of research, motivations in research, types of research, research approaches, significance of research, research process. Defining a research problem, selecting the problem, necessity of selecting the problem, techniques in defining the problem. Meaning and need of research design, features of good research design, types of research design, principle of experimental research design, development of a research plan.

Unit 2 Data collection: Methods of primary and secondary data collection, selection of appropriate method of data collection. Coding, editing and tabulation of data, charts and diagrams used in data analysis, bar and pie diagrams and their significance.

Unit 3 Scientific Communication: Meaning and significance of Scientific report writing, types of reports, steps in report writing, layout of the research report, precautions in writing research report, writing of thesis report. Importance of publishing a research paper, writing of research paper and review article.

Unit 4 Drug Regulatory Affairs: Indian Patent Act 1970 and its amendments, Concepts of IPR, criteria for granting patents, and filing an Indian patent. Patent infringement. INDA, NDA, ANDA filing, Hatch-Waxman amendments. Introduction to patent search.

Unit 5 Pharmaceutical Experimental Design: Development, validation and optimization of analytical methods based on UV, HPLC and HPTLC. Experimental designs for animal experiments, statistical analysis of experiments using laboratory animals, sample size determinations in animal experiments, controlling variability in animal experiments, experimental methodology in clinical trials. Experimental design in planning of synthesis. Statistical experimental designs for development and optimization of formulations.

PHDP-102 COMPUTER APPLICATIONS

Theory: 60

Internal Assessment: 40 Marks (Presentation: 10, Assignment : 20, Discussion : 10)

Teaching Scheme			Credits	Marks		Duration of End Semester Examination
L	T	P	C	End Semester Exam	Total	
3	0	0	3	60	60	3 hours

Instruction to Examiner: Student will attempt any five questions. Question no 1 is compulsory and having objective questions, every question carry equal marks. Examiner are instruct to frame questions from Each Unit.

Units 1 MS WORD: Features and applications related to presentation of text in suitable format and saving the data for future applications. Practical knowledge of MS Word to type the script, insert tables, figures and graphs to prepare thesis and research papers in presentable format.

Unit 2 MS EXCEL: Construction of spreadsheets from the experimental data. Design and application of formulae for calculations and their applications to the experimental data. Use of statistical tools, preparation of graphs, histograms, charts and diagrams.

Unit 3 MS POWER POINT: Preparation of power point presentations based on the topic of research. Insertion of figures, graphs, charts in presentation. Preparation of scientific posters for presentations. Use of various presentation techniques.

Unit 4 USE OF SPSS & INTERNET APPLICATIONS: Method of preparing data sheets and entering the data according to its characteristics. Use of various statistical tools on SPSS. Exploring various websites and search engines for collecting quality literature and secondary data related to research work.

Unit 5 STATISTICAL TOOLS: Measures of Central tendency and Dispersion. Probability distribution- Normal, Binomial and Poisson distribution. Parametric and Nonparametric statistics. Confidence interval, Errors. Quantitative Techniques: Levels of significance, Regression and Correlation coefficient. Use of Computers in Quantitative analysis, Chi Square Test, Association of Attributes t Test –Anova, Standard deviation Coefficient of variations. Correlation and Regression Analysis.

REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to

Research Methodology, RBSA Publishers.

2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.

3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.

4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.

5. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Additional reading

1. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.

2. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.

3. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.

4. Day, R.A., 1992.How to Write and Publish a Scientific Paper, Cambridge University Press.

5. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications

PHDP-103 RESEARCH AND PUBLICATION ETHICS (RPE)

Theory: 60

Internal Assessment: 40 Marks (Presentation: 10, Assignment: 20, Practice: 10)

Teaching Scheme			Credits	Marks		Duration of End Semester Examination
L	T	P	C	End Semester Exam	Total	
1	0	1	2	60	60	3 hours

Instruction to Examiner: Student will attempt any five questions. Question no 1 is compulsory and having objective questions, every question carry equal marks. Examiners shall frame questions from each unit on theory part only.

THEORY

Unit1: RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

Unit 2: RPE 02: SCIENTIFIC CONDUCT (2 hrs.)

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity

Unit 3: RPE 02: SCIENTIFIC CONDUCT (3 hrs.)

1. Scientific misconducts : Falsification, Fabrication, and Plagiarism (FFP)
2. Redundant publications : duplicate and overlapping publications, salami slicing
3. Selective reporting and misrepresentation of data

Unit 4: RPE 03: PUBLICATION ETHICS (4hrs.)

1. Publication ethics : definition, introduction and importance
2. Best practices/ standards setting initiative and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types

Unit 5: RPE 03: PUBLICATION ETHICS (3 hrs.)

1. Violation of publication ethics, authorship and contributor ship
2. Identification of publication misconduct, complaints and appeals
3. Predatory publishers and journals

PRACTICE

- ### RPE 04: OPEN ACCESS PUBLISHING (4 hrs.)

  1. Open access publications and initiatives
  2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies.
  3. Software tool to identify predatory publications developed by SPPU
  4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer   Journal Suggester, etc.

- ### RPE 05: PUBLICATION MISCONDUCT (4 hrs.)

  A. **Group Discussions (2 hrs.)**
     1. Subject specific ethical issues, FFP, authorship
     2. Conflicts of interest
     3. Complaints and appeals : examples and fraud from India and abroad

  B. **Software tools (2 hrs.)**
     Use of plagiarism software like Turnitin, Urkund and other open source software tools

- ### RPE 06: DATABASES AND RESEARCH METRICS (7 hrs.)

  A. **Databases (4 hrs.)**

     1. Indexing databases
     2. Citation databases: Web of Science, etc.

  B. **Research Metrics (3 hrs.)**

     1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
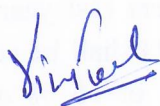   2. Metrics : h-index, g index, i10 index, altmetrics

PHDP-201 REVIEW OF LITERATURE

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Teacher's Assessment		Total	
3	1	0	4	100		100	--

The research scholar will review the important studies conducted at the national and international level either by individuals or organizations including government agencies and present the methodology adopted and important findings emerged from these studies. Based on this review of literature the researcher will identify the research gaps existing in the available literature and thus justifying the need for the present study. The researcher is supposed to follow the pattern adopted in the standard national and international research journals.

Respective supervisors will evaluate literature review submitted by the student and recommend the topic for registration.

PHDP-202   COURSE WORK VIVA-VOCE

Teaching Scheme			Credits	Marks		Duration of End Semester Examination
L	T	P	C	End Semester Viva Voce	Total	
0	0	0	4	100	100	------

As per the provisions of Ordinance of Himachal Pradesh Technical University, a student will appear for comprehensive viva.

The student at the end of each semester shall make a presentation on the progress of research work carried out during the semester to DRC. The DRC shall recommend satisfactory/unsatisfactory grade to candidate. In case a candidate earns four unsatisfactory grades, his/her registration shall stand cancelled.

Examination Scheme for Ph. D in Pharmaceutical Sciences:

1. After having been admitted, each Ph. D student shall be required by the University to undertake course work has to be passed within two semesters (1st year of registration) from the date of registration. The registration of such students shall be confirmed only if he/she has qualified minimum 12 credits with a minimum of 55 % of marks in end semester examinations including Internal marks.

2. The candidates securing minimum of 55% marks (Theory & Internal Assessment in Aggregate) or SGPA/ CGPA of 5.5 shall be declared Pass/Successful. The Fail/Unsuccessful candidate shall be allowed to reappear in the next end-semester examinations.

3. The University shall adopt 10 point grading system with letter grade as given under :

Letter Grade	Grade Point (SGPA/ CGPA)	Range of Grade Point (SGPA/ CGPA)	Class Interval (In %)
O (Outstanding)	10	Above 9 to 10	Above 90 and ≤ 100
A+ (Excellent)	9	Above 8 to 9	Above 80 and ≤ 90
A (Very Good)	8	Above 7 to 8	Above 70 and ≤ 80
B+ (Good)	7	Above 6 to 7	Above 60 and ≤ 70
B (Above Average)	6	Above 5.5 to 6	Above 55 to 60
F (Fail)	0		<55
Ab (Absent)	0		Absent

Note :

i) F = Fail and the student graded with F in course work shall be required to reappear in the examination.

ii) The SGPA/CGPA obtained by the student shall be out of the maximum of 10 points.

iii) In order to be eligible for the award of the degree of the University a student must obtain the CGPA of 5.5 or 55% marks in aggregate at the end of the programme.

iv) Semester Grade-Point Average (SGPA) mean the grade point average of a student calculated in the following manner :

$$SGPA \ (S_i) = \Sigma(C_i \times G_i)/ \Sigma C_i$$

Where C_i is the number of credits of the ith course, G_i is the grade point scored by the student the ith course and the summation is over all the course being considered in that semester.

v) Cumulatvie Grade-Point Average (CGPA) means a cumulative index grade point average of student calculated in the following manner :

$$CGPA = \Sigma(C_{si} \times S_i)/ \Sigma C_{si}$$

Where S_i is the SGPA of the ith Semester C_{si} is the total no. of credits in that semester and the summation is over all the Semester being considered.

4. The theory examinations for the course work shall be held in the month of May/June and December/January.

5. 2nd Semester onwards the research progress of the candidate shall be evaluated by the RDC (Research Degree Committee) every six months in May/June and December/January.

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