

EXAMINATION SCHEME & SYLLABUS

Ph.D.

in

**PHARMACEUTICAL SCIENCES, ALLIED HEALTH
SCIENCES, LIFE SCIENCES & BASIC SCIENCES**

To be Effective from Academic Year 2020-21 and Onwards



SARDAR BHAGWAN SINGH UNIVERSITY

BALAWALA, DEHRADUN 248001, UTTARAKHAND, INDIA

Ph.D: EXAMINATION SCHEME & SYLLABUS

Preamble

PhD. Degree of Sardar Bhagwan Singh University shall be governed with “Standards and Procedure for Award of Ph.D. Degree Regulations”. The regulations framed are subject to modifications from time to time by the University. This document provides details on Credit Based Semester System (CBSS), examination scheme and syllabus of the Ph.D. Programme of Sardar Bhagwan Singh University.

1. Medium of Instruction and Examinations

Medium of instruction and examination shall be English.

2. Working Days in Each Semester

Each semester shall consist of not less than 100 working days. The odd semesters shall be conducted from the month of July/August to November/December and the even semesters shall be conducted from the month of December/January to May/June in every calendar year.

3. Attendance and Progress

A candidate is required to put in at least 75% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

4. Schools/Departments Offering Ph.D. Programmes

The Schools/Departments which offer Ph.D. programme are listed in Table 1.

Table 1. Schools and departments offering Ph.D. programmes.

School	Departments
School of Pharmaceutical Sciences & Technology	Department of Pharmaceutics
	Department of Pharmacology
	Department of Pharmacognosy
	Department of Pharmaceutical Chemistry
School of Allied Health Sciences	Department of Physiotherapy
	Department of MLT and MM
School of Life Sciences & Basic Sciences	Department of Applied Chemistry & Basic Sciences
	Department of Biotechnology and Biochemistry
	Department of Microbiology

5. Courses of Study, Credits and Schemes for End Semester Examinations

The courses of study and schemes for end semester examinations are given in Table 2-7. Table 8 provides semester wise credit distribution for Ph.D. programme. Ph.D.

coursework credits are 16 which are spread in first and second semester. Total credits to be acquired for the award of Ph.D. are 116 (Minimum) to 123 (Maximum).

Table 2. Courses of study for **Semester 1 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDC 711	Core Course 1: Research Methodology	4	4	100
PHDC 712	Core Course 2: Research and Publication Ethics	2	2	50
PHDC 713 A/B/C/D	Elective 1: Interdisciplinary: A. Computer Applications / B. Advanced Writing & Presentation Skills / C. IPR/ D. Others [@]	2	2	50
PHDC 714	Elective 2: Subject in the Field of Discipline [§]	4	4	100
PHDP 715	Teaching Practices / Professional Practices [#]	4	8	-----
TOTAL		16	20	300

[§] Supervised Self Study [05 Seminars, 05 Assignments, 01 Problem Solving Classes/Week (n=15); All these under the supervision of Approved Supervisor/Co-supervisor]

[@] Supervised Self Study [03 Seminars, 03 Assignments, 01 Problem Solving Classes/Two Week (n=8); All these under the supervision of Approved Supervisor/Co-supervisor]

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

Table 3. Courses of study for **Semester 2 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDC 721	Elective 3: Selected Field / Subject of Research [^]	4	4	100
PHDR 722	Literature Review for Research Work [*]	2	2	50
PHDR 723	Research Proposal [*]	2	2	50
PHDR 724	Open State of the Art Seminar and Research Proposal Defence [*]	2	2	50
PHDL 725	Laboratory/Field Techniques [*]	6	12	150
PHDP 726	Teaching Practices / Professional Practices [#]	4	8	-----
TOTAL		20	18	400

[^] Require approval of DRC for selection of course.

^{*} Under Supervision of an Approved Supervisor/Co-supervisor

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

Table 4. Courses of study for **Semester 3 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDR 831	Research Work Report*	12	24	300
PHDR 832	Research Work Seminar*	2	4	50
PHDP 833	Teaching Practices / Professional Practices [#]	4	8	-----
TOTAL		18	36	350

* Under supervision of Approved Supervisor/Co-supervisor

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

Table 5. Courses of study for **Semester 4 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDR 841	Research Work Report*	12	24	300
PHDR 842	Research Work Seminar*	2	4	50
PHDP 843	Teaching Practices / Professional Practices [#]	4	8	-----
TOTAL		18	36	350

* Under supervision of Approved Supervisor/Co-supervisor

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

Table 6. Courses of study for **Semester 5 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDR 951	Research Work Report*	12	24	300
PHDR 952	Research Work Seminar*	2	4	50
PHDP 953	Teaching Practices / Professional Practices [#]	4	8	-----
TOTAL		18	36	350

* Under supervision of Approved Supervisor/Co-supervisor

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

Table 7. Courses of study for **Semester 6 of Ph.D.** and schemes for end semester examinations.

Course Code	Course	Credit Points	Hours/Week	Marks
PHDR 961	Thesis*	12	24	300
PHDR 962	Open Thesis Defense*	2	4	50
PHDP 963	Teaching Practices / Professional Practices [#]	4	8	-----
PHDX 964	Co-Curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities) [∞]	8-15	-----	-----
TOTAL		18	36	350

* Under supervision of Approved Supervisor/Co-supervisor

[#] As allocated by the Director/Head/Incharge/Coordinator of the University/Approved Research Center

[∞] Ph.D. candidate shall submit an attested copy of certificate/proof for claiming any of the activity given in the above table. The credit points assigned for co-curricular activities shall be forwarded by the Supervisor through RDC to DRC for recommendation and award of credits. A copy of certificate/proof is to be submitted to COE for keeping a record of these credits. The criteria to acquire these credit points shall be defined by the RDC from time to time.

Table 8. Semester wise credit distribution for Ph.D. programme.

Semester	Credit Points
1	16
2	20
3	18
4	18
5	18
6	18
Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	Minimum = 8 Maximum =15
TOTAL	Minimum = 116 Maximum = 123

6. Co-curricular Activities

Minimum 8 credits and maximum 15 credits for co-curricular activities are to be acquired for the award of Ph.D. degree. Co-curricular activity with their corresponding credits are enlisted in Table 9.

Table 9. Guidelines for Awarding Credit Points for Co-curricular Activities

Name of the Activity	Credits Eligible / Activity
Participation in National Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	1
Participation in International Level Seminar/Conference/Workshop/Symposium/ Training Programs (related to the specialization of the student)	2
Academic Award/Research Award from State Level/National Agencies	1
Academic Award/Research Award from International Agencies	2
Research / Review Publication in National Journals (Indexed in Scopus / Web of Science)	1
Research / Review Publication in International Journals (Indexed in Scopus / Web of Science)	2
Book Chapter Publication with National Publishers	1
Book Chapter Publication with International Publishers	2
Authored/Edited Book Publication with National Publishers	1
Authored/Edited Book Publication with International Publishers	2
Patent Application Filed in India	1
Patent Grant in India	2
Patent Application Filed in Foreign Country/PCT	2
Patent Grant in Foreign Country	3
Technology Transfer in India	2
Technology Transfer in Foreign Country	4

Note: International Conference: Held Outside India

International Journal: The Editorial Board Outside India

7. Provisional Registration and Confirmation of Ph.D. Registration

All Ph.D. candidates admitted shall undergo provisional registration in Ph.D. Provisional registration for Ph.D. shall be confirmed on successful completion of coursework (PHDC 711, PHDC 712, PHDC 713, PHDC 714 & PHDC 721) and comprehensive examination. Comprehensive examination includes examinations of courses PHDR 722, PHDR 723 & PHDR 724 & PHDL 725.

8. Supervisor Allocation and Supervised Self Study of Electives

Supervisor/Co-supervisor allocation shall be done by DRC in first semester. Allocated Supervisor/Co-supervisor shall engage Ph.D. students for seminars, assignments and problem solving classes of Elective 1 and Elective 2. Supervised Self Study for Elective 1 involves the conduct of 05 Seminars, 05 Assignments, 01 Problem Solving Class/Week (n=15). For Elective 2 the supervised self study involves 03 Seminars, 03 Assignments, 01 Problem Solving Class/Two Week (n=8). All these under the supervision of Approved Supervisor/Co-supervisor]. If Supervisor is not from the specialization in which Ph.D. student is pursuing Ph.D., a Co-supervisor from the specialization shall be responsible for smooth conduct of teaching requirements of Elective courses (Elective 1 and Elective 2).

9. Elective 3: Selected Field / Subject of Research

Ph.D. students shall select an online course Swayam or NPTEL Portal or MOOC or course from websites like Udemy/Coursera/Edx of not less than 40 h duration and get its written approval from RAC/DRC before enrollment in that course. Percentage/grade from the certificate of selected course may be converted to marks out of 100 and credited to student. In case if marks cannot be calculated, a written examination by Supervisor/Co-supervisor will be required to assess the performance of the Ph.D. student.

10. Promotion and Award of Grades

A student shall be declared PASS and eligible for getting grade in a course of Ph.D. programme if he/she secures at least 55% marks in that particular course.

11. Carry Forward of Marks

In case a student fails to secure the minimum 50% in any Theory/Practical/Other course as specified in 6, then he/she shall reappear for the end semester examination of that course after payment of re-examination fee.

12. Reexamination of End Semester Examinations

Reexamination of end semester examination shall be conducted as per the schedule given in Table 10. The exact dates of examinations shall be notified from time to time by Controller of Examinations (COE).

Table 10. Tentative schedule of end semester examinations

Semester	For Regular Candidates	For Failed Candidates
1, 3, 5	December/January	May/June
2, 4, 6	May/June	December/January

13. Allowed to Keep Terms (ATKT)

No student shall be admitted to any examination unless he/she fulfills the norms given in 3. ATKT rules are applicable as follows:

A student shall be eligible to carry forward all the courses (except PHDR 722, PHDR 723, & PHDR 724) of I and II semesters till the III semester examinations. However,

he/she shall not be eligible to attend the courses of IV semester until all the courses of I, II and III semesters are successfully completed.

A student shall be eligible to get his/her CGPA upon successful completion of the courses of I to IV semesters within the stipulated time period as per the norms.

Note: Grade AB should be considered as failed and treated as one head for deciding ATKT. Such rules are also applicable for those students who fail to register for examination(s) of any course in any semester.

14. Grading of Performances

Letter grades and grade points allocations: Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table 11.

Table 11. Letter grades and grade points equivalent to Percentage of marks and performances

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	5.5 to 6	55 to 60
F (Fail)	0		<55
Ab (Absent)	0		Absent

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

15. The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five courses (Theory/Practical) in a semester with credits C1, C2, C3 and C4 and the student's grade points in these courses are G1, G2, G3 and G4, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4}{C1 + C2 + C3 + C4}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C1G1 + C2G2 + C3G3 + C4 * \text{Zero}}{C1 + C2 + C3 + C4}$$

16. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier

The CGPA is calculated as:

$$\text{CGPA} = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6}{C1 + C2 + C3 + C4 + C5 + C6}$$

where C1, C2, C3,.... is the total number of credits for semester I,II,III,.... and S1,S2, S3,....is the SGPA of semester I,II,III,.... .

17. Declaration of Class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction = CGPA of. 7.50 and above

First Class = CGPA of 6.00 to 7.49

Second Class = CGPA of 5.00 to 5.99

18. Evaluation of Research Work

All the students shall undertake a research project under the supervision of a teacher in Semester III to VI and submit a research work report in triplicate (Semester III to Semester V) and Pre-Thesis (four copies) and Thesis (three copies) at the end of VI semester as per the "Guidance Document for Typing, Formatting and Submission of Thesis & Dissertation".

Submission of Pre-Thesis/Thesis and its evaluation shall comply with Section 15 to Section 19 of "Standards and Procedure for Award of Ph.D. Degree Regulations".

The internal and external examiner appointed by the University shall evaluate the research work report/thesis as per the criteria given below.

Evaluation of Research Work Report/Thesis:

Objective(s) of the work done: 25 Marks

Methodology adopted: 100 Marks

Results and Discussions: 150 Marks

Conclusions and Outcomes: 25 Marks

Research Work Seminar/Open Thesis Defense: Presentation of work (20 Marks);
Communication skills (10 Marks) and Question and answer skills (20 Marks)

Evaluation of Thesis shall comply with Section 19 of “Standards and Procedure for Award of Ph.D. Degree Regulations”.

19. Award of Ranks

No ranks and medal shall be awarded on the basis of SGPA or final CGPA.

20. Award of Degree

Candidates, who fulfill the credit requirements, (116-123 credits) summarized in Table 8, shall be eligible for the award of Ph.D. degree during the ensuing convocation.

21. Revaluation of Answer Scripts

Answer scripts of core or elective courses of Ph.D. coursework may be re-evaluated subjected to the payment of Reevaluation Fee within a month from the date of declaration of result.

22. Extension of Thesis & Open Thesis Defense Examination

A student may submit request for extension of End Semester Examination for Thesis & Open Thesis Defense for a period of next 6 months, if RAC/DRC is not satisfied for the submission of final thesis or the student does not satisfy any of the requirements for the submission of Thesis. For second extension of further 6 months, the student has to seek approval through proper channel by Dean Research/Chief Programme Coordinator by extension request citing valid reasons for non-completion of the research work. Extension beyond four years will be permitted on payment of 25% of semester fee for first 6 months and 50% of semester fee for another 6 months. Extension beyond five years will be permitted on payment of 75% of semester fee for first 6 months and 100% of semester fee for subsequent extensions per semester. Each extension report shall be prepared by RAC/DRC and communicated to the Dean Research/Chief Programme Coordinator and COE.

23. Re-Registration after Break of Study

If a student does not appear in two consecutive end semester examination, his/her registration in Ph.D. shall be cancelled. Such candidate has to seek re-registration to the Ph.D. programme by paying a re-registration fee. In no case the total tenure starting from the first registration to the final award of Ph.D. degree shall exceed six years.

SEMESTER 1**PHDC 711 RESEARCH METHODOLOGY****4 CREDIT POINTS**

- 1. General Research Methodology (10 h)**
Research, objective, requirements, practical difficulties, review of literature, study design, types of studies, strategies to eliminate errors/bias, controls, randomization, crossover design, placebo, blinding techniques.
- 2. Biostatistics (15 h)**
Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts, statistical tests of significance, type of significance tests, parametric tests (students “t” test, ANOVA, Correlation coefficient, regression), non-parametric tests (wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.
- 3. Good Research Practices (10 h)**
Research environment, training, supervision and mentoring, research procedures, safeguards, data practices and management, collaborative research, publication and dissemination, reviewing, evaluating and editing data, examples/cases studies.
- 4. Using Animals for Research (5 h)**
Animal pain and distress, alternative methodologies, ethical expectations, the role of institutional animal ethics committees and national committees, guidelines for laboratory animal facility, case studies.
- 5. A 3Rs Perspective on Ethics in Working with Animal Models (5 h)**
The 3Rs in UK/US/India, regulatory aspects of EMA/FDA/CPCSEA guidelines for animal experimentation, the use and the ethics inside the 3Rs for working with animal models of disease, ethics in animal experimentation in proceeding to (human) clinical research, case studies.
- 6. Human Participation in Research (10 h)**
Science and society, informed consent, compensation & coercion, non-vulnerable and non-competent subjects, privacy and confidentiality, balancing harms and benefits (randomized controlled trials), justice in research, science and society, ethical issues in new biotechnologies, institutional review board, inclusion/exclusion IRB review, the Nuremberg code, declaration of Helsinki, CIOMS guidelines, ICMR guidelines for human and children, case studies, online resources.
- 7. Research on Microorganisms and Biotechnology (5 h)**
Safety issues, ethical guidelines.

PHDC 712 RESEARCH AND PUBLICATION ETHICS 2 CREDIT POINTS

- 1. Research Philosophy and Ethics (4 h)**
Introduction to philosophy: definition, nature and scope, concept and branches; Ethics, definition, moral philosophy, nature of moral judgments and reactions, the impact of research on environment, pollution, case studies.
- 2. Scientific Conduct (4 h)**
Ethics with respect to science and research intellectual honesty, research integrity, scientific fraud (falsification and fabrication), plagiarism, selective reporting and misrepresentation of data, transparency, data sharing/open data policies, data disclosure policies of journals, examples/case studies.
- 3. Publication Ethics (4 h)**
Publication ethics (definition, introduction and importance), best practices, standard setting initiatives and guidelines (COPE, WAME, etc.), publisher's policies, a guide to ethical writing (Office of Research Integrity, US), examples/case studies.
- 4. Publication Misconduct, Plagiarism and Research Integrity (5 h)**
Problems that lead to unethical behavior and vice versa, types; violation of publication ethics, authorship and contributorship; conflicts of interest, simultaneous submission, salami slicing, image manipulation, subject-specific ethical issues, identification of publication misconduct, complaint and appeals, interpersonal responsibilities, institutional responsibility, retraction, examples and fraud from India and abroad/case studies, types of plagiarism, Why one plagiarizes?, some case studies on plagiarism and its impact in research, regulations to protect academic integrity and prevent plagiarism (e.g. UGC Regulations 2018), methods to prevent and control plagiarism, similarity indexes and its applications, image duplication, research integrity, data manipulation and ways to identify and prevent, what is acceptable and what is not acceptable in a Thesis and in journals with respect to copying to text?, examples/case studies.
- 5. Softwares and Tools for Plagiarism and English Grammar Check (2 h)**
Turnitin, Urkund, open-source softwares/tools for plagiarism checking and English grammar checking softwares like grammarly, etc., examples/hand on exercise.
- 6. Predatory Publishing (2 h)**

Predatory publishers and journals, software tools to identify predatory publications, journal finder and journal suggestion tools, examples/case studies, online resources.

7. Open Access Publishing (2 h)

Open access publications and initiatives, SHERPA/RoMEO online resource for checking publisher copyright and self-archiving policies, DOAJ literature search, examples/case studies.

8. Databases, Research Metrics and Clinical Trials Registries (7 h)

Indexing databases: Pubmed, Pubchem, Google Scholar, Chemical Abstracts, Science Citation Index, Ulrichsweb, China National Knowledge Infrastructure (CNKI), J-STAGE, MedIND and IndMED, Index Copernicus, DOAJ, ROAD, OpenAire, etc.; Citation Databases: Web of Science, Scopus, Crossref, DOI, science index, etc.; Impact Factor, Source Normalized Impact Factor (SNIP), SJR (SCImago Journal Rank), IPP, CiteScore, article influence and eigen factor, h index, g index, i10 index, altmetrics, cumulative impact index; Patent Databases (Espacenet, USPTO Patent Search, PatentScope, etc.), Clinical Trials Registries.

PHDC 713 ELECTIVE 1: INTERDISCIPLINARY

PHDC 713A. COMPUTER APPLICATIONS

2 CREDIT POINTS

Spreadsheet (Microsoft Excel, Google Sheets, Open Office Spreadsheet), Presentation Tools (Microsoft Powerpoint, Google Slides, Open Office Impress), Online literature searching (Pubmed, Google Scholar, DOAJ Search), Biomedical databases (Pubmed, Pubchem, Clinical Trials Registries, Patent Databases (Espacenet, USPTO Patent Search, PatentScope), Reference managing softwares (Endnote, Zotero, Mendeley), Process or formulation Optimization Softwares, Softwares for Statistical Calculations, Tools for thesis writing (grammarly etc) & editing, Plagiarism detection tools (Turnitin, Urkund, open access tools), Softwares/tools for Group Communications (Zoom, Meet, Teams, etc.), Collaborative documents (Shared document creation using Google docs/forms/sheets/slides, Office 365, Dropbox paper, etc), Annotate PDFs (Mendeley, ReadCube Papers, Good Reader, Foxit PDF Reader, Adobe), Store and Organize Files (Google Drive, One Drive, Drop box, etc), Network and Interest Groups (ResearchGate, LinkedIn, Google+ communities, etc), Researcher Profiles (Publons, Researcher ID, ORCID, Kudos, Mendeley Profile, Vidwan, etc.), Repositories for Data Sharing/Storage (Inflibnet, Figshare, DSpace, etc.)

(30 h)

PHDC 113B INTELLECTUAL PROPERTY RIGHTS 2 CREDIT POINTS**1. Intellectual Property Rights (8 h)**

Intellectual Property Rights, Different means for Protection of financial Interests of Researches, PCT convention, WIPO patent application procedure, Indian Patent Application Procedure

2. Copyright Protection of Research Papers, Books and Allied Works (7 h)

Indian copyright law and digital technologies, Berne convention, WIPO copyright treaty (WCT), WIPO performance and phonogram treaty PPT); Protection for computer data bases, multimedia works, case studies

3. Ethics and Values in Intellectual Property (15 h)

IP and ethics-positive and negative aspects of IPP; if Societal responsibility; Avoiding unethical practices, intellectual property rights relevant to pharmaceuticals, the role of intellectual property in pharmaceutical product life cycle management, examples/case studies.

**PHDC 713C ADVANCED WRITING AND PRESENTATION SKILLS
2 CREDIT POINTS****1. Advanced Writing Skills (15 h)**

Scientific publications of various types (books, journals, reports, etc.), Writing research papers. The structure and components of research papers (title, abstract, introduction, materials and methods, results, discussion, conclusions, references). Preparing, submitting, revising and publishing scientific manuscripts. The peer-review process. Dealing with editors and reviewers. Writing scientific reports and theses. Presenting analytical data: designing effective tables and illustrations (line drawings, graphs and charts, photographs) and captions for these. Presenting analytical data: designing effective tables and illustrations (line drawings, graphs and charts, photographs) and captions for these.

2. Advanced Presentation Skills (15 h)

Preparing and giving oral presentations: softwares and visual aids; conferences, meetings and viva voce examinations. Content, timing, clarity and other aspects. Actual presentations by students taking the course.

PHDC 713D OTHER SUBJECTS

2 CREDIT POINTS

List of subjects and syllabus to be provided by the Department

PHDC 714 ELECTIVE 2: SUBJECT IN THE FIELD OF DISCIPLINE

2 CREDIT POINTS

List of subjects and syllabus to be provided by the Department

SEMESTER 2**PHDC 721 ELECTIVE 3 (SELECTED FIELD / SUBJECT OF RESEARCH)
4 CREDIT POINTS**

Course (40 h duration) from Swayam or NPTEL Portal or MOOC or course from websites like UdeMy/Coursera/Edx in the selected field/subject of research will be acceptable provided that an approval for the same has been obtained from Doctoral Advisory Committee and a certificate of its completion is submitted after completion.

**PHDR 722 LITERATURE REVIEW FOR RESEARCH WORK
2 CREDIT POINTS**

Ph.D. candidate will review submit a compiled literature review in the prescribed format to the DRC for evaluation. A review paper may be published in a journal indexed in Scopus/Web of Science.

PHDR 723 RESEARCH PROPOSAL 2 CREDIT POINTS

Ph.D. candidates shall submit, as per prescribed format, to RAC for evaluation.

**PHDR 724 OPEN STATE OF THE ART SEMINAR AND DEFENSE OF
RESEARCH PROPOSAL 2 CREDIT POINTS**

Ph.D. student shall present his work to RAC, through PPT presentation, for evaluation.

Supervisor shall invite other supervisors/ faculty members, Ph.D. scholars, PG students of the Department for an open defense of proposed research.

PHDL 725 LABORATORY/FIELD TECHNIQUES 6 CREDIT POINTS

Ph.D. student shall learn laboratory/field techniques in the guidance of Supervisor. A laboratory record of performed experiments/field work shall be submitted to RAC for evaluation.

SEMESTER 3-5

PHDC 831/841/951/961 RESEARCH WORK REPORT/THESIS

12 CREDIT POINTS

Research work report/thesis, as per formatting instruction of the University, to be submitted at the end of semester for evaluation by the RAC. A seminar/viva voce for the same shall be arranged by RAC.

PHDC 832/842/952 RESEARCH WORK SEMINAR 2 CREDIT POINTS

Research work is to be presented and evaluated by RDC.

SEMESTER 1-6

PHDP 715 /PHDP 726/PHDP 833/PHDP 843/PHDP 953/PHDP 963 TEACHING PRACTICES / PROFESSIONAL PRACTICES 4 CREDIT POINTS

- A certificate of classes/laboratories engaged for at least 8 hours per week shall be submitted to DRC for claiming these credit points for teaching practices.
- A certificate from Industry/Research Organisation/Company/Institution be submitted for professional work of at least 8 hours per week.