



**CHANDIGARH UNIVERSITY UTTAR PRADESH, INDIA**



Guidelines for Ph.D. Course Work viz. credit requirements, duration, syllabus, marks, and minimum standards for completion

## Ph.D. Program

The University runs Ph.D. program in many disciplines. As per provision in clause No.9 of the University Grants Commission (Minimum Standards and Procedure for Award of Ph.D. Degrees) Regulations, 2022, and the Chandigarh University Ph.D. Ordinance Clause No. 11, Course Work comprising of courses on Research Methodology, Quantitative Techniques & Computer Applications, Research Project and Advances in the respective Subject discipline is to be cleared by the Ph.D. candidates.

**Goal:** The objective of the Ph.D. programme at Chandigarh University is to provide advanced training in specific fields of study, preparing students to assume leadership roles in research, teaching, and service across academia, industry, business, and government sectors.

**Outcomes:** On completion of their doctoral degree the Ph.D. scholars will be able to:

1. Critically apply theories, methodologies, and knowledge to address fundamental questions in their primary area of study. (Research, Critical Thinking, Content Knowledge)
2. Pursue research of significance in the discipline or an interdisciplinary or creative project. (Research, Critical and Creative Thinking)
3. Collect data and analyze and interpret results for meaningful decisions. (Analysis)
4. Demonstrate skills in scientific oral and written communication sufficient to publish and present work in their field and to prepare grant proposals. (Communication)
5. Apply the principles of ethics in their field and in academia. (Ethics)
6. Demonstrate, through service, the value of their discipline to the community at large. (Service, Content Knowledge)
7. Demonstrate a mastery of skills and knowledge at a level required for teaching in their discipline, along with assessment of scholar
8. Learning. (Content Knowledge, Teaching)
9. Interact productively with people from diverse backgrounds as both leaders/mentors and team members with integrity and professionalism. (Communication, Leadership)

**Objectives:** In the duration of their Ph.D. work, the scholars shall be able to:

1. Develop deep and substantive knowledge in their area of specialization
2. Master analytical and methodological skills necessary to evaluate, interpret, and conduct research within their area of specialization and related interdisciplinary fields
3. Design and carry out original, independent research that contributes meaningfully to the advancement of knowledge in their discipline.
4. Communicate research findings effectively, both orally and in writing, to academic and professional audiences.
5. Collaborate effectively with individuals from diverse educational, cultural, and professional backgrounds.
6. Demonstrate a strong commitment to ethical research practices and uphold academic integrity in all aspects of scholarly work.

7. Exhibit the ability to teach undergraduate-level courses in their field of specialization with clarity, competence, and pedagogical effectiveness.

**Guidelines for Ph.D. Course Work viz. credit requirements, duration, syllabus, marks, and minimum standards for completion:**

1. Duration of Course Work for the Ph.D. program is one semester. Qualifying the Course Work examination shall be treated as a prerequisite for enrolment in the Ph.D. program. The Ph.D. candidate is mandatorily required to qualify the Course Work examination in the initial one or two semesters from the date of registration.
2. All candidates admitted to the Ph.D. program shall join the prescribed Course Work which includes the following course papers:
  - i. Research Methodology (Course Code 25UCT801)
  - ii. Research & Publication Ethics (Course Code 25UCT802)
  - iii. Quantitative Techniques & Computer Applications (Course Code 25UCH801)
  - iv. Advances in respective Ph.D. Subject (Course Code 25--T801)
  - v. Research Project (Course Code 25UCR801)

The syllabuses for the above mentioned courses are as appended.

3. 'Credit' defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week so as to complete the contents of the syllabus in a semester. As per guidelines of the UGC, a 1 credit course = 1 hour of teaching per week (or 15 hours of teaching per semester). Thereby, Credits have been assigned to the courses on the basis of the number of hours of instruction (viz. lectures /tutorials /laboratory work /seminars /project work /other forms of learning) as required, in order to complete the course contents within a semester.
  - i. 1 Credit = 15 hours of instruction per semester
  - ii. 2 Credits = 30 hours of instruction per semester
  - iii. 3 Credits = 45 hours of instruction per semester
  - iv. 4 Credits = 60 hours of instruction per semester
  - v. 6 Credits = 90 hours of instruction per semester

Based on the above, a total of 16 Credits have been assigned to the Ph.D. Course Work.

4. Ph.D. Course Work instruction in 25UCT801, 25UCT802 and 25UCH801 will be coordinated by the Research and Development Cell, and teaching in Advances in respective Ph.D. Subject (i.e. Course Code 25UCR801 & 25--T801) will be conducted by the respective department.
5. The progress of each candidate in the Course Work will be assessed as follows:
  - i. Formatively, leading to generation of Internal Assessment marks bearing a weightage of 40% of the total allocated marks for each course paper.
  - ii. Summatively, by an End Semester Examination held by the University, bearing a weightage of 60% of the total allocated marks for each course paper.

**6. Internal Assessment (IA):**

6.1. Internal Assessment for 25UCT801, 25UCT802 and 25UCH801 will be done by and finalized by the teaching faculty these courses.

6.2. Internal Assessment for 25--T801 will be done by the teaching faculty of the respective Departments under coordination of the Head of the Department.

6.3. For 25UCR801 Research Project will be done by the teaching faculty of the respective Departments under coordination of the Head of the Department

**7. End semester Examination (ESE):**

A candidate will be eligible for appearing in the Ph.D. Course Work end semester examination only if he/she-

i. Has minimum 75% attendance in all courses

ii. Has secured minimum of 55% in the Internal Assessment component of all the courses viz. 25UCT801, 25UCT802, 25UCH801, 25PHD—, 25UCR801 separately

**8. Evaluation Scheme:**

The evaluation scheme indicating the distribution of marks in the Internal Assessment and End Semester Examination components, and the Credits per Course Work paper, is as follows:

Course Code	Name of the Course	Total Credits per Course	Internal Assessment	End Semester Examination	Total Marks
			Marks	Marks	
25UCT801	Research Methodology	6	40	60	100
25UCT802	Research & Publication Ethics	2	40	60	100
25UCH801	Quantitative Techniques & Computer Applications	2	20	30	50
25--T801	Advances in respective Ph.D. Subject	4	40	60	100
25UCR801	Research Project	2	50		50
<b>Total Credits</b>		<b>16</b>	<b>Grand Total Marks</b>		<b>400</b>

Note:-To pass/qualify the Ph.D. Course Work the candidate must secure a minimum 55% of the allocated marks in the Internal Assessment and End Semester Examination components of each of the courses viz. 25UCT801, 25UCT802, 25UCH801 and 25--T801, 25UCR801, separately.

# Chandigarh University

## Ph.D. Program Course Work Syllabus

**Course Name: Research Methodology**

**Course Code: 25UCT801**

**Credits: 6**

### **SYLLABUS:**

Broadly, the syllabus of the Course will be as follows:

#### **Unit-I**

##### **Introduction to Research & Processes:**

Nature and purpose of scientific research, Parameters of research; Definition of construct and variables; Introduction of research; Research process; Steps in research process; Choosing a research topic; Basis of choosing research topics; Identification of interdisciplinary areas.

Research problem definition; Identification literature review/research gap; Formulation of research questions/objectives; Significance and relevance of research problems; Research plan construction, Importance of research methodology.

#### **Unit-II**

##### **Research Design:**

Research design-Qualitative and Quantitative research; Concepts and type of research designs; Design of research on the basis of application-pure and applied; Descriptive Research-Qualitative and Quantitative; Cross-sectional and Longitudinal studies; Quantitative-Field studies, Field experiments and Laboratory experiments; Design of research on the basis of techniques/methodology-Exploratory, Case Study, Focus Group, & Descriptive; Design of research on the basis of area of research-Research in Science/Engineering/Social Sciences-Surveys & Observation.

#### **Unit-III**

##### **Questionnaire and Scaling:**

Types of Questionnaires -open ended & close ended; Disguised and skip questions; Steps in design of questionnaire; Types of measurement scales; Scale response formats Tools (Likert, Graphic, Semantic scales); Comparative and non-comparative scales; Items (or statements); Attitude and measurement; Steps in development of a scale; Validity and reliability.

#### **Unit-IV**

##### **Sampling Methods:**

Sampling and Data collection; Population and samples; Techniques of sampling-Random, Stratified, Systematic, Multistage-sampling; Primary and secondary sources of data; Estimation of sample size. Parametric and not parameters test. Data analysis, methods and type, Interpretations.

## Unit-V

### Research/Report Writing:

Special elements in thesis; Headings and sub-headings; Footnotes; Tables and Figures; Title page; Table of contents; Introduction; Review of literature; Materials and methods; Results; Discussion; Conclusions; Summary; Appendices; Bibliography & References.

**Research proposal writing and funding agencies:** Components of a research proposal, Proposal summary, introduction/ background, different funding agencies - Govt / Non-Govt, International etc.

**Note: Regarding unit 4 and 5 science/ engineering and applied science faculty can adopt their research methodology, analysis pattern and applicable software and rest of stream (management, legal studies, liberal arts or social sciences) can choose their relevant software methods and analyst topics during teaching.**

### SUGGESTED BOOKS & REFERENCES for RESEARCH METHODOLOGY:

1. Cooper, "Business Research Methods", Tata McGraw Hill, New Delhi.
  2. Fowler, F.J. Survey Research Methods. New Delhi, Sage, 1993
  3. Goode, W.J and Hatt, P.K. Methods in Social Science Research. New Delhi, McGraw Hill, 1986
  4. Leddy, Paul. D Practical Research: Planning Design. London, Clive Bingley. 1980
  5. Coffey, A., & Atkinson, P. (1996). Making sense of qualitative data. Thousand Oaks, CA: Sage.
  6. Girden, E.R. (1996). Evaluating research articles from start to finish. Thousand Oaks, CA: Sage.
  7. Mason, J. (1996). Qualitative reasoning. London; Thousand Oaks, CA: Sage.
  8. Spoull, N.L. (1995). Handbook of research methods: a guide for practitioners and students in the social sciences. (2nd ed.). Metuchen, NJ: Scarecrow Press.
  9. Tesch, R.(1990).Qualitative research: analysis types and software tools. New York:Falmer Press.
  10. Gentleman, J.F., & Whitmore, G.A. (Eds.). (1994). Case studies in data analysis. New York: Springer-Verlag.
  11. Mischler, E.G. (1986). Research interviewing: context and narrative. Cambridge, MA: Harvard University Press.
  12. Research Methodology: Methods and Techniques by Kothari, CR and Garg, Gaurav, New Age International.
  13. An introduction to Intellectual Property Rights by J.P. Mishra, Central Law Publication.
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# Chandigarh University

## Ph.D. Program Course Work Syllabus

**Course Code: 25UCT802**

**Course Name: Research & Publication Ethics**

**Credits: 2**

### **SYLLABUS:**

Broadly, the syllabus of the Course will be as follows:

#### **Unit-I**

##### **Philosophy and Ethics:**

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
3. Intellectual Property Rights: basics of IPR and types of IPR, patentable and non-patentable inventions, PCT and WIPO, procedure for patent filing, copyright filling and design registration, patent licensing and commercialization, compulsory licensing, Indian Patents Act 1970.

#### **Unit-II**

##### **Scientific Conduct:**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Selective reporting and misrepresentation of data

#### **Unit-III**

##### **Publication Ethics:**

1. Publication ethics: definition, introduction and importance
2. Redundant publications: duplicate and overlapping publications, salami slicing
3. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
4. Conflicts of interest
5. Publication misconduct: definition, concept, problems that lead to unethical behavior & vice versa, types
6. Violation of publication ethics, authorship and contributor ship
7. Identification of publication misconduct, complaints and appeals
8. Predatory publishers and journals

#### **Unit-IV**

##### **Open Access Publishing:**

1. Open access publications and initiatives
2. SHERP A/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 Suggested, etc.

## **Unit-V**

### **Publication Misconduct:**

#### **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.)**

1. Use of plagiarism software like Turnitin, DrillBit, other open source software tools

### **Databases and Research Metrics**

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

1. Indexing databases
2. Citation databases: Web of Science, Scopus, Google Scholar/Medline/Pubmed etc.

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

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

### **SUGGESTED BOOKS AND REFERENCES for RESEARCH & PUBLICATION ETHICS:**

1. Ethics in Scientific Research: An Examination of Ethical Principles and Emerging Topics. By Cortney Weinbaum, Eric Landree, Marjory S. Blumenthal, Tepring Piquado, Carlos Ignacio Gutierrez
  2. Scientific Integrity: Text And Cases In Responsible Conduct Of Research (2005) By Francis L Macrina, Edition 3, Publisher: Asm Press, ISBN 13: 9781555813185
  3. Ethics in Science Education, Research and Governance – book by a team of Indian National Science Academy (INSA) fellows. Eds. Muralidhar K, Ghosh Amit & Singhvi AK. ISBN: 9788193948217
  4. Ethics In Qualitative Research: Controversies And Contexts (2012) By Martyn Hammersley and Anna Traianou. Edition 1, Sage Publications Ltd, ISBN 13: 9780857021403
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# Chandigarh University

## Ph.D. Program Course Work Syllabus

**Course Code: 25UCH801**

**Course Name: Quantitative Techniques & Computer Applications (Practical)**

**Credits: 2**

### **SYLLABUS:**

Broadly, the syllabus of the Course will be as follows:

#### **Unit-I (6 hrs. = 2 hrs. theory + 2 hrs. practical + 2 hrs. hands-on practice)**

**Data Management and Data analysis:** Introduction to data management; Classification and Methods of Data Analysis.

**Measures of Central Tendency:** Mean, Median and Mode (Merits and Demerits); Data Presentation; Partition values.

**Measures of Dispersion:** Range; Inter-quartile; Quartile Deviation; Mean Deviation; Standard Deviation; Skewness; Kurtosis.

#### **Unit-II (12 hrs. = 4 hrs. theory + 5 hrs. practical + 3 hrs. hands-on practice)**

**Correlation:** Introduction; Types; different methods.

**Regression:** Introduction; Types; Least square method; Regression correlation

Statistical Hypotheses and Test of significance; Procedure for testing of hypothesis; Determining levels of significance; Type I and II errors; ANOVA: One way, two way; Chi square test and its applications; Students 't' distribution; Non-parametric statistical techniques; Run test; Sign test; Wilcoxon rank sum test; Mann-Whitney U test; Kruskal Wallis test; Introduction to factor analysis.

#### **Unit-III (4 hrs. = 2 hrs. practical + 2 hrs. hands-on practice)**

Computational Tool –

Creating, editing and running procedures from the syntax file in SPSS; Creating and editing output files; Saving output files in WORD in SPSS, MATLAB, Python and other advance software used for data analysis in Engineering/Science/ Social Sciences.

#### **Unit-IV (4 hrs. = 2 hrs. practical + 2 hrs. hands-on practice)**

MS Excel: Introduction to spreadsheets; Basic text and cell formatting; Basic arithmetic calculation; Charts; Functions and formulae; Data validation, Basics of a measurement and its interpretation-mean, standard deviation, variance, correlation coefficient; Data analysis.

#### **Unit-V (4 hrs. = 2 hrs. practical + 2 hrs. hands on practice)**

Web Technologies: Searching scholarly information; Primary and secondary databases; Searching techniques; Google scholar and Scopus and research evaluation; Managing bibliography-Use of Mendeley and Zotero.

**SUGGESTED BOOKS AND REFERENCES for QUANTITATIVE TECHNIQUES & COMPUTER APPLICATIONS:**

1. Sabine, Landau, Brian S. Everitt. "A handbook of statistical analyses using SPSS", 2004 by Chapman & Hall/CRC Press LLC.
  2. Practical statistics for medical research by Douglas G. Altman
  3. Biostatistics for Medical, Nursing and Pharmacy Students By Abhaya Indrayan and L. Satyanarayana
  4. Medical Statistics: Principles and Methods by K. R Sundaram, S. N Dwivedi, and V. Sreenivas, 2015
  5. Statistical Analysis: Microsoft Excel 2010, Book by Conrad Carlberg.
  6. Statistics and Data with R: An Applied Approach Through Examples, Jeremiah Y. Cohen and Yosef Cohen.
  7. Introduction to Statistics with SPSS by Ben Baarda, De Goede Martijn, Corvan Dijkum.
  8. Leon & Leon, Internet for Everyone, Leon Tech World
  9. Ron Masfield, MS Office, Tech Publication
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