Centre for Physiotherapy and Rehabilitation Sciences
Jamia Millia Islamia, New Delhi -110025

# Ph.D. Programme

# Course work Syllabus

# 2022-23

# About the Course work

**Objective:** The objective of the course work is to make physiotherapy research scholars aware of recent developments in the field of physiotherapy and rehabilitation. The course work primarily aims to integrate clinical science with the physiotherapy clinical knowledge and skills required to examine, diagnose, manage and conduct research on patients and/or subjects. The conduct of research includes of various methods and techniques of research, data collection, interpretation and dissemination of results and publication of research work in areas pertinent to the profession of physiotherapy.

**Rules and regulations:** All scholars, including in-service/part-time, shall have to do 'Course Work' which will be treated as a prerequisite for the Ph.D registration. The attendance, evaluation and minimum requirement for successful completion of the course work, all other rules and regulations of course work shall be as per M.Phil/ PhD. Regulation of [Ordinance 9 (IX)] of Jamia Millia Islamia, in place at the time of admission.

**Name and duration:** The name of the course work shall be Ph.D. Course work ( Physiotherapy ) with duration of 6 months (1 semester).The total credits shall be 24.

**Course components:** The course work shall comprise of 7 courses [5 compulsory and optional courses] each of 100 marks ( IA- 25, End Term-75 ).

# PhD. Course Work Components

| Course Code | Name of Course | Credits | Type | Evaluation | | |
|---|---|---|---|---|---|---|
| | | | | Internal Assessment | End term | Total |
| PhP-101 | Research Methods and Biostatistics | 4 | Compulsory | 25 | 75 | 100 |
| PhP-102 | Research publication & Ethics | 2 | Compulsory | 25 | 75 | 100 |
| PhP-103 | Body Structure and Function Assessment | 4 | Compulsory | 25 | 75 | 100 |
| PhP-104 | Outcome Measurement and Analysis | 4 | Compulsory | 25 | 75 | 100 |
| PhP-105 | Annotated Bibliography | 2 | Compulsory | 25 | 75 | 100 |
| PhP-106 | Cardio-Pulmonary Physiotherapy and Rehabilitation | 4 | Optional | 25 | 75 | 100 |
| PhP-107 | Musculoskeletal Physiotherapy and Rehabilitation | 4 | Optional | 25 | 75 | 100 |
| PhP-108 | Neurological Physiotherapy and Rehabilitation | 4 | Optional | 25 | 75 | 100 |
| PhP-109 | Sports Physiotherapy and Rehabilitation | 4 | Optional | 25 | 75 | 100 |

**Optional: Any two optional courses shall be selected by the candidate other than the 4 compulsory courses.**

| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-101 | Research Methods and Biostatistics | 4 | Compulsory |

Course description: The course involves about the study of research designs, methods, data collection, and interpretation of findings in physiotherapy and rehabilitation research.

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the various research methods and its application in the field of physiotherapy and rehabilitation research.

Course Outcome: The physiotherapy research scholar should be able to formulate research and data collection methods at the end of the course

SECTION-A

Research Methods

1. Introduction to Physiotherapy and Rehabilitation research, evidence based medicine etc
2. Measurement theory, levels of measurement etc
3. Research goals,objective, hypothesis
4. Research Design: Principles of research design, research problem questions and hypotheses, research paradigms, design overview, research validity.
5. Sampling techniques: Simple, systematic and stratified random samples.
6. Experimental Designs: General principles in experiment design, randomization and replication; requirements for a good design.
7. Type of research design: Case studies, case series studies, cross sectional and longitudinal studies, case control studies, randomized controlled trials, systematic review and meta-analysis etc.
8. Experimental errors: Various methods of controlling experimental errors, the need for control, matching, local control, concomitant variation, sampling and non-sampling errors.
9. Structure, formulation and implementation of research proposal
10. Structure, formulation and implementation of research report
11. Writing for grants

Section-B

BIOSTATICS

1. Statistical reasoning: data set, frequency distribution, central tendency, variability, Normal distribution, sampling distribution, significant difference, errors, powers, statistical conclusion validity.
2. Parametric statistics, Non-Parametric Statistics
3. Sampling
4. Sample size calculation
5. Analysis of variance
6. Correlation- regression analysis, single case analysis, Content analysis
7. Modern graphic techniques, Computers in health science research
8. Quantitative data analysis, qualitative data analysis
9. Communication of data, writing and organizing data
10. Statistical analysis software

Suggested Reading


1. Creswell WJ, (2014) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches , Sage.
2. Campbell JM, Machin D, Walters JS( 2010) Medical Statistics A Textbook for the Health Sciences, John Wiley and Sons Ltd.
3. Forthofer NR, Lee SE, Hernandez M (2007) Biostatistics A Guide to Design, Analysis and Discovery, Academic Press.
4. van Belle G, Fisher DL, Heagerty JP, Lumley T( 2004)Biostatistics A Methodology For the Health Sciences, Wiley.
5. Rossi JR (2010) Applied Biostatistics for the Health Sciences, Wiley.


| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-102 | Research publication & ethics | 2 | Compulsory |

Course description: The course involves the study about various aspects of research process and ethics of publication.

Course objective: The objective of the course is to scholars familiarize the publication process and ethical considerations of research publication of the data.

Course Outcome: The scholar should be able to communicate and publish the research out comes independently/ under supervision.

1. Philosophy and ethics :

a. Introduction to philosophy: definition and scope, concept, branches, ethics: definition, moral philosophy, nature of moral and judgements and reactions.
b. Code of conduct of ethics in research – Nuremberg code, Helsinki declaration and I.C.M.R. guidelines on ethics involving human subjects in research .
c. Biosafety – Management and disposal of bio hazard waste.

2. Scientific conduct, publication ethics & misconduct :

a. Ethics with respect to science and research,intellectual honesty and research integrity, scientific misconducts: falsification, fabrication and plagiarism (FFP),redundant publications: duplicate and overlapping publications, salami slicing, selective reporting and misrepresentation of data.
b. Publication ethics: definition, introduction and importance. Best Practices/Standards setting initiatives and guidelines: COPE, WAME etc.Conflicts of interest, publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types.Violation of publication ethics, authorship and contributorship. Identification of publication misconduct, complaints and appeals.Predatory publishers and journals.Subject specific ethical issues, FFP, authorship.Complaints and appeals: examples and fraud from India and abroad.Use of plagiarism software like turnitin, Urkind and other open source software tools.

3 .Open access publishing

a. Open access publications and inititatives, Sherpa/RoMEO online resource to check publisher copyright & self-archiving policies.
b. Software tool to identify predatory publications developed by SPPU,Journal finder/journal suggestions tools viz. JANE,Elsevier Journal Finder Springer Journal Suggester, etc.

4. Databases and research metrics:

a. Indexing databases,citation databases: Web of Science, Scopus, etc.
b. Impact Factor of journal as per journal Citation Report, SNIP, SJR, IPP, Cite Score.Metrics: H-index, g index, i10 index, almetrics.

Suggested Reading

1. Bird, A. (2006) Philosophy of Science, Routledge.
2. Alasdair M(1967) A Short History of Ethics: London
3. Chaddah P, (2018) Ethics in Comparative Research: Do not get scooped, do not get plagiarized, ISBN:978-9387480865

4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition: National Academies Press.
5. Resnik, D.B. (2011). What is ethics in Research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from https://www.neihs.nih.gov/resources/bioethics/whatis/inde.cfm Beall, J. (2012). Predatory publishers are corrupting open access. Nature 489(7415),179-179.
6. https://doi.org/10.1038/489179a
7. Indian National Science Academy (INSA),Ethics in Science Education, Research and governance (2019). ISBN:978-81-939482.http://www.insaindia.res.in/pdf/Ethics Book.pdf

| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-103 | Body Structure and Function Assessment | 4 | Compulsory |

Course description: The course involves about the study of body structure and function assessment in relation to physiotherapy and rehabilitation research.

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the various tools of assessment of body structure and function assessment in physiotherapy and rehabilitation research.

Course Outcome: Critically apply and synthesise knowledge in order to select and use appropriate assessment methods to evaluate body structure and function in o physiotherapy and rehabilitation research.

1. Anthropometry
a. Assessment of Body Mass
b. Assessment of Muscle mass
c. Assessment of Fat
d. Measurement of body angles

2. Muscles strength and Flexibility
a. Neurophysiology of muscle strength
b. Methods of Muscle strength testing
c. Muscle Strength Testing instruments
d. EMG & NCV
e. Methods of flexibility assessment

3. Human Movement analysis

a. Instruments for movement analysis
b. Gait analysis
c. Posture analysis
d. Recording and documenting human movement

4. International Classification of Functioning, Disability and Health (ICF)

a. ICF and healthcare
b. Measurement using ICF model
c. ICF Core sets

5. Measurement of Biochemical Markers

a. Inflammatory markers
b. Neurotransmitters & Hormones
c. Markers of Muscle damage
d. Physiological parameters of cardiorespiratory function

Suggested Reading


1. Preedy, V. R. (Ed.). (2012). Handbook of anthropometry: physical measures of human form in health and disease. Springer Science & Business Media.
2. International Classification of Functioning, Disability and Health (ICF). https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health
3. Jacquelin Perry, M. (2010). Gait analysis: normal and pathological function. New Jersey: SLACK.
4. Amundsen, L. R. (1990). Muscle strength testing: instrumented and non-instrumented systems. Churchill Livingstone


| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-104 | Outcome Measurement and Analysis | 4 | Compulsory |

Course description: The course involves about the study of outcomes used in physiotherapy and rehabilitation research.

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the various tools of outcome and its analysis in the field of physiotherapy and rehabilitation research.

Course Outcome: Critically apply and synthesise knowledge in order to select and use appropriate outcome measures in physiotherapy and rehabilitation research.

1. Clinical Decision Making
    a. International Statistical Classification of Diseases and Related Health Problems (ICD)
    b. Health care models.
    c. Process of Diagnosis.
    d. International Classification of Health Interventions (ICHI)

2. Outcome measurements in Health Conditions
    a. Acute Health Conditions
    b. Chronic Health Conditions
    c. End of Life Care

3. Outcome based rehabilitation
    a. Measurement tools for outcome
    b. Selection and appropriateness of outcome measures.
    c. Rehabilitation protocols

4. Tools for outcome assessment
    a. Balance Assessment
    b. Functional Assessment
    c. Quality of assessment
    d. Environment Assessment

5. Pain assessment
    a. Pain and rehabilitation
    b. Evaluation of pain markers
    c. Machine based assessment
    d. Scales for pain assessment

Suggested Reading


1. International Statistical Classification of Diseases and Related Health Problems (ICD). https://www.who.int/standards/classifications/classification-of-diseases
2. International Classification of Health Interventions (ICHI) https://www.who.int/standards/classifications/international-classification-of-health-interventions
3. Stokes, E. K. (2010). Rehabilitation outcome measures. Churchill Livingstone.
4. Cooney, M., & Quinlan-Colwell, A. (2020). Assessment and multimodal management of pain: an integrative approach. Elsevier Health Sciences.

| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-105 | Annotated Bibliography | 2 | Compulsory |

Course description: The course involves literature review and critical analysis of research in field of physiotherapy and rehabilitation.

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the literature search, analysis and documentation in systematic and scientific manner.

Course Outcome: Critically apply and synthesise knowledge based on literature search in specific area, connect scientific findings, find research gaps and future research scope in field of physiotherapy.

1. Review of Research Papers

    a. Introduction to review of publications, phases of critical appraisal, significance of critical appraisal of research reports, preparation of review reports.
    b. Analysis of different types of research papers such as, quantitative, qualitative, experimental, quasi experimental, RCT and observational studies.
    c. A review of minimum of 20 papers related to the chosen field of study is to be included.
    d. Reference Styles
    e. Software's for Reference Management

2. An annotated bibliography (AB) shall be submitted on the papers reviewed and a presentation shall be done as part of evaluation process. APA reference style to be followed for the writing part of AB.

Suggested Reading

Beatty, L., & Cochran, C. A. (2020). *Writing the Annotated Bibliography: A Guide for Students & Researchers*. Routledge.

| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-106 | Cardio-Pulmonary Physiotherapy and Rehabilitation | 4 | Optional |

Course description: The course involves about the study of assessments and intervention strategies for cardio-pulmonary physiotherapy and rehabilitation research.

Course objective: : The objective of the course is to make the physiotherapy research scholar aware of the various tools of assessment and intervention strategies in the field of cardio-pulmonary physiotherapy and rehabilitation research

Course Outcome: Critically apply and synthesise knowledge in order to select, plan, explain, demonstrate and evaluate appropriate assessments and intervention strategies in cardio-pulmonary physiotherapy and rehabilitation research.

1. Overview of Pulmonary Rehabilitation
    a. Assessment of the Patients of Pulmonary Rehabilitation
    b. Outcome measures used in Pulmonary Rehabilitation
    c. Exercise testing and training
    d. Program Management
    e. Scales and questionnaire used in pulmonary rehabilitation
2. Stress testing
    a. Exercise stress test
    b. Pharmacological stress test
    c. Nuclear stress test
3. Cardiac autonomic function testing
    a. Heart rate variability
    b. Heart rate recovery
    c. Cardiac autonomic reflex test (CART's)
4. Exercise capacity evaluation and psychometric analysis
    a. Six minute walk test
    b. Incremental shuttle walk test
    c. Endurance shuttle walk test
5. Overview of Cardiac Rehabilitation

a. Phases of cardiac rehabilitation
b. Patient Education and skill training
c. Barriers in cardiac rehabilitation and specific strategies to overcome barriers
d. Secondary prevention and risk factor reduction

Suggested Reading


1. Adams, K. J. (2003). Cardiac Rehabilitation and Exercise. In *Handbook of Clinical Nutrition and Aging* (pp. 419-436). Totowa, NJ: Humana Press.
2. American Association of Cardiovascular & Pulmonary Rehabilitation. (2006). *AACVPR cardiac rehabilitation resource manual: promoting health and preventing disease*. Human Kinetics.
3. Donner, C., Ambrosino, N., & Goldstein, R. S. (Eds.). (2020). *Pulmonary rehabilitation*. CRC Press.
4. Cherniak, N. S., Altose, M. D., Homma, I., & Winslow, C. (1999). Rehabilitation of the patient with respiratory disease. *Shock*, *12*(4), 327.
5. American College of Sports Medicine. (2013). *ACSM's guidelines for exercise testing and prescription*. Lippincott williams & wilkins.


| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-107 | Musculoskeletal Physiotherapy and Rehabilitation | 4 | Optional |

Course description: The course involves about the study of assessments and intervention strategies for musculoskeletal physiotherapy and rehabilitation physiotherapy and rehabilitation research

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the various tools of assessment and intervention strategies in the field of musculoskeletal physiotherapy and rehabilitation research

Course Outcome: Critically apply and synthesise knowledge in order to select, plan, explain, demonstrate and evaluate appropriate assessments and intervention strategies in musculoskeletal physiotherapy and rehabilitation research

1. Pain
   a. Classification of Pain
   b. Models of Pain
   c. Neurophysiology of Pain
   d. Management of Pain
   e. Principles of Chronic Pain Management

2. Manual Techniques
   a. Osteopathic and Chiropractic School of Thoughts

b. Basic Principles and Physiology of Various Manual Therapy Techniques Used in Physiotherapy
c. Recent Advances and Controversies in manual therapy research
d. Manual Therapy Approaches to General and Specific Musculoskeletal Dysfunctions

3. Gait and Posture
   a. Gait and function
   b. Musculoskeletal Disorders and Gait and Posture Deviations
   c. Management of Gait and Posture Abnormalities in Acute and Chronic conditions

4. Exercise Interventions in Musculoskeletal Conditions
   a. Foundation of the Rehabilitation Process
   b. Treating Physiologic Impairments During Musculoskeletal Rehabilitation
   c. Tools for Rehabilitation in Musculoskeletal Disorders and Pain
   d. Intervention Strategies for Musculoskeletal Injuries

5. Inflammatory and Infectious Disorders
   a. Pathophysiology of Various Inflammatory and Infectious Disorders
   b. Evidence-based Assessment and Management of Bone and Joint Infections
   c. Evidence-based Assessment and Management of Rheumatological Conditions

Suggested Reading


1. Cooney, M., & Quinlan-Colwell, A. (2020). *Assessment and multimodal management of pain: an integrative approach*. Elsevier Health Sciences.
2. Jacquelin Perry, M. (2010). Gait analysis: normal and pathological function. *New Jersey: SLACK*.
3. Wilson, F., Gormley, J., & Hussey, J. (Eds.). (2011). *Exercise therapy in the management of musculoskeletal disorders*. John Wiley & Sons.
4. Magee, D. J., Zachazewski, J. E., & Quillen, W. S. (2007). *Scientific foundations and principles of practice in musculoskeletal rehabilitation*. Elsevier Health Sciences.
5. Magee, D. J., Zachazewski, J. E., Quillen, W. S., & Manske, R. C. (2015). *Pathology and intervention in musculoskeletal rehabilitation* (Vol. 3). Elsevier Health Sciences.
6. Walker, J. M., & Helewa, A. (2004). Physical rehabilitation in arthritis.


| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-108 | Neurological Physiotherapy and Rehabilitation | 4 | Optional |

Course description: The course involves about the study of assessments and intervention strategies for neurological physiotherapy and rehabilitation

Course objective: : The objective of the course is to make the physiotherapy research scholar aware of the various tools of assessment and intervention strategies in the field of Neurological physiotherapy and rehabilitation

Course Outcome: Critically apply and synthesise knowledge in order to select, plan, explain, demonstrate and evaluate appropriate assessments and intervention strategies in neurological physiotherapy and rehabilitation

1. Neurology of Human movement
    a. Role of motor component of nervous system
    b. Role of sensory component
    c. Motor control issues due to nervous system impairment.
    d. Rehabilitation of movement.

2. Repair of Nervous System
    a. Repair of CNS
    b. Repair of PNS
    c. Repair of ANS

3. Neural plasticity
    a. Models of neural plasticity
    b. Neural Plasticity and rehabilitation.
    c. Factor affecting neural plasticity

4. Neurorehabilitation techniques
    a. Muscle strengthening
    b. Tone abnormality
    c. Functional Training
    d. FES

5. Gait and Posture
    d. Gait and function
    e. Neurological disorders and gait and posture deviations
    f. Management of gait and posture abnormalities in acute and chronic conditions

Suggested Reading

1. Jacquelin Perry, M. (2010). Gait analysis: normal and pathological function. *New Jersey: SLACK*.
2. Barnes, M. P., & Good, D. C. (Eds.). (2013). *Neurological rehabilitation*. Newnes.
3. Carr, J. H., & Shepherd, R. B. (2010). *Neurological rehabilitation: optimizing motor performance*. Elsevier Health Sciences.
4. Dobkin, B. H. (2003). *The clinical science of neurologic rehabilitation* (Vol. 67). Oxford University Press.

5. Raskin, S. A. (Ed.). (2011). *Neuroplasticity and rehabilitation.* Guilford Press.

| Course Code | Name of Course | Credits | Type |
|---|---|---|---|
| PhP-109 | Sports Physiotherapy and Rehabilitation | 4 | Optional |

Course description: The course involves about the study of assessments and intervention strategies for sports physiotherapy and rehabilitation research

Course objective: The objective of the course is to make the physiotherapy research scholar aware of the various tools of assessment and intervention strategies in the field of sports physiotherapy and rehabilitation research

Course Outcome: Critically apply and synthesise knowledge in order to select, plan, explain, demonstrate and evaluate appropriate assessments and intervention strategies in sports physiotherapy and rehabilitation research

1. Clinical and Functional Rehabilitation
   a. Clinical Decision Making Process
   b. Clinical and Functional testing of Athletes
   c. Clinical Rehabilitation
   d. Functional Rehabilitation

2. Conditioning
   a. Exercise Prescription
   b. Aerobic Training
   c. Resistance Training
   d. Flexibility

3. Environment , Training and Participation
   a. High altitude training and competition
   b. Exercise in the cold and cold injuries
   c. Exercise in the heat and heat injuries
   d. Travel consideration for the athlete

4. Behavioral and psychological problems
   a. Eating Disorders
   b. Doping
   c. Overtraining

5. Ergoenics
   a. Pharmacological Approach
   b. Nutritional Approach
   c. Sports Training and Physiological Approach
   d. Latest trends in sports training

Suggested Reading


1. American College of Sports Medicine. (2013). ACSM's guidelines for exercise testing and prescription. Lippincott Williams & Wilkins.
2. Swain, D. P., Brawner, C. A., & American College of Sports Medicine. (2014). *ACSM's resource manual for guidelines for exercise testing and prescription*. Wolters Kluwer Health/Lippincott Williams & Wilkins.
3. Williams, M. H. (1998). *The ergogenics edge: pushing the limits of sports performance*. Human Kinetics Publishers.
4. Stubbs, R. (2011). *The sports book*. Dorling Kindersley Ltd.
5. Madden, C., Putukian, M., McCarty, E., & Young, C. (2013). *Netter's Sports Medicine E-Book*. Elsevier Health Sciences.