RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M.S. Ramaiah University of Applied Sciences

Program Structure and Course Details

Of

Master of Physiotherapy

Batch 2022 onwards

Registrar
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

M.S. Ramaiah University of Applied Sciences

M.S. Ramaiah College of Physiotherapy

Principal and Dean
M.S. Ramaiah College of Physiotherapy
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Dean - Academics
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Approved by the Academic Council at its 26th Meeting held on 14th July 2022

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Programme Specifications
Master of Physiotherapy (MPT) Programme

Programme:	Department:
Neurological Sciences	Neurological Physiotherapy

M.S. Ramaiah College of Physiotherapy
M.S. Ramaiah University of Applied Sciences

Principal and Dean
M.S. Ramaiah College of Physiotherapy
M.S. Ramaiah University of Applied Sciences
University House, New BEL Road, MSR Nagar, Bangalore – 560 054
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Dean-Academics
M.S. Ramaiah University of Applied Sciences
Bangalore-560 054

Contents

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University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional, education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and
services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and
excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavours. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

Objectives

To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society

To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society

To promote health, human well-being and provide holistic healthcare

To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences

To instil the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business

To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in

To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programmes.

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Section-1

Programme Specifications: Neurological Sciences

Faculty	M.S. Ramaiah College of Physiotherapy
Department	Neurological Physiotherapy
Programme	Neurological Sciences
Dean of College	Prof. Savita Ravindra

1.1 Title of The Award

MPT in Neurological Sciences

1.2 Mode of Study

Full Time

1.3 **Awarding Institution /Body**

M.S. Ramaiah University of Applied Sciences

1.4 Joint Award

Not Applicable

1.5 Teaching Institution

M.S. Ramaiah College of Physiotherapy, M.S. Ramaiah University of Applied Sciences

1.6 Programme Approved date by the Academic Council of the University

14th July 2022

1.7 Next Review Date:

July 2024/ 2025

1.8 Programme Approving Regulating Body and Date of Approval

1.9 Programme Accredited Body and Date of Accreditation

1.10 Grade Awarded by the Accreditation Body

1.11 Programme Accreditation Validity Duration

1.12 Programme Benchmark

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1.13. Rationale for the Programme

Neurological Physiotherapy is a specialist area of physiotherapy focused on the treatment of individuals with neurological conditions. Neurological disorders affect the functioning of the brain, spinal cord, and nerves. Neurological conditions can have a devastating impact on the lives of the sufferers, along with family and friends. Disturbances in the travelling of messages between the brain and the body can result in the loss of movement, sensation, coordination, and balance. Other aspects of bodily function, such as perception, speech, memory, cognition, and behavior may also be affected. As a system that has been extensively studied but not completely understood, the complexity of the system and the wide range of deficits that emerge is too large to be accommodated in an entry level program. The depth of knowledge and skills that are required to manage these deficits require a specialist program that focuses on these complex disorders.

Neurological Physiotherapists as specialists can help provide significant benefits to patients suffering from nervous system or neurological disorders to improve function, reduce symptoms, regain, build strength and endurance and improve quality of life. Therefore, it is important that neurological physiotherapists work in close partnership with other members of the multidisciplinary team including speech and language therapists, occupational therapist, dieticians, nurses, and other medical specialties.

1.14. Programme Aims and Objectives

A Neurology specialist physiotherapist will be competent to evaluate, assess and arrive at reasoning-based hypothesis in patients with neuro-medical or neuro-surgical trauma or disease. Neurology Physiotherapists work based on standardized frameworks including ICF to develop, maintain, restore and optimize health and function. They will be competent to use current evidence to assess, treat and manage Neurological dysfunctions in children, adults and elders. They will be competent to act as a team leader of a multidisciplinary rehabilitation team and contribute to interdisciplinary care planning and implementation of Neuro-rehabilitation methods. They will be competent to take up academic and research positions in their area of expertise. They are competent to be autonomous clinical practitioners.

The aims and objectives are to:

1. Impart knowledge of theoretical sciences relevant to restoration of function
2. Assess and plan an appropriate treatment strategy specific to the needs of the patients
3. Train the post graduate students in all level of restorative work.
4. Incorporate advanced diagnostics and technology in patient management.
5. In still in student aptitude for research.
6. Inculcate leadership skills quality.

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1.15. Programme Outcomes

At the end of the Masters Programme the student will be able to:

PT 165 PO1: Demonstrate the ability to independently plan and conduct a structured comprehensive patient-centred physiotherapy assessment and formulate a functional diagnosis

PT 165 PO2: Demonstrate the ability to use clinical reasoning and critical thinking to establish patient-centred goals and prescribe an individualized plan based on established standards of practice

PT 165 PO3: Demonstrate evidence-based interventional skills in managing health conditions across lifespan in different settings using reflective practice

PT 165 PO4: Conduct research work under supervision and communicate the findings

PT 165 PO5: Display entrepreneurial, pedagogical and leadership skills in a team across various healthcare and academic settings.

1.16. Programme Structure

The postgraduate program is designed as a program, wherein at the end of two years, a programme-end examination will be conducted by the University. The programme will consist of four courses and the student will have to pass all the courses collectively. In addition, the programme will have an ongoing assessment of performance and the student will be required to complete a set of defined prerequisites in order to be eligible for appearing in the programme ending examination.

The following are the courses a student is required to complete to appear in the programme ending examination

	Course Title	Code
1	Research	PT F 5 01 A
2	Basic Sciences for Neurological Physiotherapy	PT C 5 10 A
3	Neuro-physiotherapy Assessment	PT C 5 11 A
4	Neuro-Physiotherapy Treatment	PT C 5 12 A

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Students' enrolled in the MPT programme shall also undertake the following electives:

Programme Electives – These electives are mandatory for the MPT Programme.
- Professional Ethics
- Basic Life Support
- Basic course in Biomedical Research

Open Electives – These electives a candidate has to take up a minimum of 1 elective.
- Advanced Life Support
- Medico legal aspects in patient care
- Quality management in Healthcare
- Financial Literacy

*Outline of all the electives is provided in the **Annexure 1**

1.17. Course Delivery Structure

The course will be delivered Monday to Saturday of the week. The calendar of events of the Programme and the courses shall be available at the beginning of the Programme. The detailed time table shall be available to the students at the beginning of each month.

1.18. Teaching Learning Methods

The Teaching Learning methods will include but not limited to:

1. Lectures
2. Seminars
3. Group discussions
4. Self-directed Learning
5. Journal review meetings
6. Demonstrations and Skill Labs
7. Case Discussion and Presentation
8. Patient Care in various settings
9. Field visits
10. Inter disciplinary meetings and discussions
11. Continuing Professional Development Programs
12. Conferences / Workshop / Symposium programmes
13. Research

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Section-2
Course specifications
Course 1: Fundamentals in Physiotherapy Practice, Pedagogy and Research

Course Title	Fundamentals in Physiotherapy Practice, Pedagogy and Research
Course Code	PT F 5 01 A
Course Type	Core Theory Course
Department	Neurological Sciences Physiotherapy
College	Physiotherapy

1. Course Summary

This fundamental course in physiotherapy is designed to train postgraduate students in principles of professional practice, research methods, biostatistics and ethics. It also provides training in application of exercise physiology and electrophysiology in clinical decision making. Beyond subject knowledge, the course also aims to train the postgraduates in teaching skills, management skills and entrepreneurship

2. Course Size and Credits

Number of Credits	NA
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours	As per the Academic Regulations
Number of Weeks	As per the Academic Regulations
Department Responsible	Neurological Sciences Physiotherapy
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

Upon completion of the course, the postgraduate student will be able to:

PT F 5 01 A CO1: Discuss the principles of professional standards and ethics in evidence-based physiotherapy practice.
PT F 5 01 A CO2: Analyse and apply appropriate research methods and relevant biostatistics in research
PT F 5 01 A CO3: Apply the principles of exercise physiology and electrophysiology in clinical decision making
PT F 5 01 A CO4: Discuss different learning theories and taxonomies.
PT F 5 01 A CO5: Demonstrate teaching learning methods in microteaching environment.
PT F 5 01 A CO6: Explain the management processes and responsibilities as applied to principles of physiotherapy practice
PT F 5 01 A CO7: Discuss the nature of entrepreneurship in rehabilitation

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4. Course Contents

1 Principles and Core Professional Values of Physiotherapy Practice

a. Definition of Physiotherapy, Scope of Practice b. General and Professional competencies
c. Physiotherapy Knowledge, Skill and Education Framework
d. Introduction to World Physiotherapy Standards of Physical Therapy Practice Guideline
e. International Classification of Functioning Disability and Health.
f. Principles of Evidence Based Practice in Physiotherapy

2 Research Methodology and Biostatistics

Designing Clinical Research: Basic Ingredients

a. Getting Started: The Anatomy and Physiology of Clinical Research
b. Fundamentals of Literature Search and Review
c. Conceiving the Research Question and Developing the Study Plan
d. Choosing the Study Subjects: Specification, Sampling, and Recruitment
e. Planning the Measurements: Precision, Accuracy, and Validity
f. Hypotheses and Underlying Principles to Estimating Sample Size and Power

Designing Clinical Research: Study Designs

g. Designing Cross-Sectional, Case–Control and Cohort Studies
h. Enhancing Causal Inference in Observational Studies
i. Designing a Randomized Blinded Trial, Alternative Clinical Trial Designs and their Implementation Issues
j. Designing Studies of Diagnostic Tests
k. Research Using Existing Data
l. Fundamentals of Qualitative Research Methods
m. Fundamentals of Systematic Reviews and Meta-analysis

Ethical Principles in Conducting Research

n. ICMR Ethical Guidelines for Biomedical Research

Implementation of Clinical Research

o. Designing Questionnaires, Interviews, and Online Surveys p. Implementing the Study and Quality Control
q. Data Management

Biostatistics

r. Basic Fundamentals of Biostatistics s. Probability and Normal Distribution
t. Descriptive Statistics: Measures of Central Tendency and Spread
u. Hypothesis Testing: One-Sample Inference, Two-Sample Inference, Multi-sample Inference,
v. Hypothesis Testing: Nonparametric Methods, Categorical Data
w. Regression, Correlation Methods and Diagnostic Tests

Consuming and Disseminating Research

x. Strategies for following Emerging Evidence, Clinical Practice Guidelines and Clinical pathways
y. Best Practices in Research Dissemination
z. Writing a Manuscript for Publication

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3 **Exercise Physiology**

a. Fundamentals of Human Energy Transfer
b. Source of Nutrition and Energy, Macro and Micro Nutrients, Food Energy and Optimum Nutrition for Exercise
c. Energy Expenditure During Rest and Physical Activity
d. Body Composition, Its Evaluation, Obesity and Weight Control
e. Training the Anaerobic and Aerobic Energy Systems

4 **Electrophysiology**

a. Instrumentation for neuromuscular electrical stimulation.
b. Muscles plasticity in response to electrical stimulation.
c. Electrical stimulation and its effects on various systems.

5 **Pedagogy in Physiotherapy Education**

a. Basics of Adult Learning Theories including Learning Styles
b. Formulating Intended Learning Outcomes.
c. Teaching Learning Methods
d. Assessment Methods

6 **Management, Entrepreneurship and Leadership in Physiotherapy Practice**

a. Introduction to Management in Physiotherapy: Definition, Principles and Functions
b. Management Process: Planning, Organizing, Directing, Controlling. Decision making.
c. Responsibilities of the Physiotherapy Manager
d. Entrepreneurship in Physiotherapy Practice: Need, Advantages and Opportunities, Challenges and Barriers
e. Leadership: Need, Relevance, Competencies and Characteristics

5. Course Map (CO-PO Map)

Course 1: Fundamentals in Physiotherapy Practice, Pedagogy and Research (PT F 5 01 A)

Program Outcome / Course Outcome	PT 163 PO1	PT 163 PO2	PT 163 PO3	PT 163 PO4	PT 163 PO5
PT F 5 01 A CO1		✓			
PT F 5 01 A CO2				✓	
PT F 5 01 A CO3	✓		✓		
PT F 5 01 A CO4				✓	✓
PT F 5 01 A CO5				✓	✓
PT F 5 01 A CO6			✓		
PT F 5 01 A CO7					✓
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution					

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6. Course Teaching and Learning Methods

The Teaching and Learning Methods will include but not limited to:

Sl. No.	Teaching and Learning Methods	
1	**Lectures**	✓
2	**Seminars**	✓
3	**Group discussions**	✓
4	**Self-directed Learning**	✓
5	**Journal review meetings**	✓
6	**Demonstrations and Skill Labs**	✓
7	**Case Discussion and Presentation**	✓
8	**Patient Care in various settings**	✓
9	**Field visits**	
10	**Inter disciplinary meetings and discussions**	✓
11	**Continuing Professional Development Programs**	✓
12	**Conferences / Workshop / Symposium programmes**	✓
13	**Research and Dissertation**	✓

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Masters of Physiotherapy (MPT) Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document.

8. Course Resources

1. World Physiotherapy (2019) Description of Physical Therapy: Policy Statement. Available from: https://world.physio/sites/default/files/2020-07/PS-2019-Description-of-physical-therapy.pdf
2. World Physiotherapy (2011) Physical Therapist Professional Entry Level Education Guideline. (Available from: https://world.physio/sites/default/files/2020-07/G-2011-Entry-level-Education.pdf)
3. CSP (2011) Physiotherapy Framework: Putting physiotherapy Behaviours, Values, Knowledge & Skills into Practice [updated May 2020](Available from: https://www.csp.org.uk/professional-clinical/cpd-education/professional-development/professional-frameworks)
4. Expected Minimum Competencies for an Entry Level Physiotherapist in the Europe Region World Physiotherapy Guidance Document (Available from: https://www.erwcpt.eu/education/expected_minimum_competencies_for_entry_level)

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5. Evidence-Based Medicine: How to Practice and Teach EBM, 2nd Edition: By David L. Sackett, Sharon E. Straus, W. Scott Richardson, William Rosenberg, and R. Brian Haynes, Churchill Livingstone, 2000
6. Rob Herbert, Gro Jamtvedt, Kåre Birger Hagen, Judy Mead. Practical Evidence-Based Physiotherapy (Second Edition), Churchill Livingstone, 2011, ISBN 9780702042706,
7. World Physiotherapy (2011) Standards of Physical Therapy Practice Guideline(Available from: https://world.physio/sites/default/files/2020-06/G-2011-Standards-practice.pdf)
8. 2017 ICMR National Ethical Guidelines for Biomedical and Health Research involving Human Participant
9. 2020 ICMR Policy on Research Integrity and Publication Ethics (RIPE)
10. Designing Clinical Research 4th Edition. Stephen B. Hulley et al. Published By: Lippincott Williams & Wilkins. ISBN-13: 9781469840543
11. Medical Biostatistics (Chapman & Hall/CRC Biostatistics Series). 4th Edition 2017. Abhaya Indrayan, Rajeev Kumar Malhotra. Chapman and Hall/CRC. ISBN 9781498799539
12. Exercise Physiology Nutrition, Energy, and Human Performance. 8th Edition. William D. McArdle PhD, Frank I. Katch , Victor L. Katch. Lippincott Williams & Wilkins. ISBN/ISSN: 9781451191554
13. Principles of Medical Education. 4th Edition. Tejinder Singh, Piyush Gupta, Daljit Singh. 2013. Jaypee Publishers.
14. Management in Physical Therapy Practices, 2nd Edition. Catherine G. Page PT, MPH, PhD. ISBN-13: 978-0-8036-4033-7
15. Heather A. Current thinking on Leadership and Physiotherapy Practice. 2016. Report Prepared for AGILE Professional Network of the Chartered Society of Physiotherapy (Available from: https://agile.csp.org.uk/system/files/current_leadership_thinking_and_physiotherapy_practice.pd)

9. Course Organization

Course Code	**PT F 5 01 A**	
Course Title	**Fundamentals in Physiotherapy Practice, Pedagogy and Research**	
Course Leader's Name	Dr. Sundar Kumar	
Course Leader's Contact Details	**Phone:**	9739468755
	E-mail:	sundar.rcp@msruas.ac.in
Course Specifications Approval Date	26.09.2022	
Next Course Specifications Review Date	01.07.2024	
Subsequent Course Specifications Review Date		

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Course 2: Foundations of Neurological Sciences

Course Title	Foundations of Neurological Sciences
Course Code	PT C 5 10 A
Course Type	Core Theory Course
Department	Neurological Sciences Physiotherapy
College	Physiotherapy

1. Course Summary

This course is designed to give information about Neuro-anatomical, Neuro-physiological and pathophysiological & pathomechanical framework. It imparts fundamental knowledge on structure and function of Central and Peripheral Nervous system of the human body. This course facilitates the students to gain better understanding on Nervous System diseases and to prepare them for further study in the course discipline.

2. Course Size and Credits:

Number of Credits	NA
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours	As per the Academic Regulations
Number of Weeks	As per the Academic Regulations
Department Responsible	Neurological Sciences Physiotherapy
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

On completion of the course, the postgraduate student will be able to

PT C 5 10 A CO1: Discuss the mechanisms and role of the nervous systems influencing movement behaviour in both normal and abnormal conditions of the human body

PT C 5 10 A CO2: Discuss the role of exercises in the modulating of motor behaviour in normal and abnormal conditions.

PT C 5 10 A CO3: Apply the normal Neuro-motor control, motor learning, motor development and motor behaviour towards enhancing learning and plasticity in the neuromuscular system

PT C 5 10 A CO4: Apply a comprehensive knowledge of the theories and principles underlying movement and – behaviour of the sensory-motor system

4. Course Contents

1. **Neuro-Anatomy and Neuro-Physiology**
   a. Central nervous system,
   b. Peripheral nervous system and c. Autonomic Nervous system

2. **Pathology and clinical features of Nervous system disorders**

   a. Pathological changes and clinical features in progressive and non-progressive disorders of Central and Peripheral nervous system causing movement dysfunction.

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3. Motor Development

a. Motor development [Reflex, Gross Motor, Fine Motor]
b. Sensory development
c. Cognitive development d. Social development

4. Motor control

a. Physiology of Motor control [Movement organization at a cortical level, contributory role of subcortical, Brainstem structures and cerebellum]
b. Theories of Motor Control [Reflex Theory, Hierarchical Theory, Systems Theory, Dynamical systems theory, Equilibrium point theory, Ecological Theory, Uncontrolled, Manifold Theory]
c. Kinematic and Kinetic Motor Control variables

5. Motor behaviour of basic functional tasks [Walking, Postural control and Object interaction with Hands]

a. Goal and description of motor tasks
b. Development and variation of motor tasks across different age groups c. Neural control of motor tasks
d. Biomechanics of motor tasks
e. Role of environment variables in task performance across different stages of development

6. Motor learning and Motor Relearning with principles of promoting neuroplasticity

a. Physiology of Motor learning b. Stages of Learning
c. Classification of Motor Tasks
d. Practice and feedback for motor tasks e. Measurement of Motor Learning
f. Neuro-plasticity, principles and types
g. Adaptation across musculoskeletal system in nervous system disorders
h. Genetic and metabolic influences on neural plasticity
i. Effect of Neuropharmacology on exercise, recovery and reorganization
j. Role of Electrophysiological Agents in neuromodulation of Tone, pain and Function

7. Exercise promotion and disease prevention

a. Concept of Health, disease, disability and Neuro-rehabilitation care delivery within the Indian context incorporating caregiver education and training. b. Need for motivation in Neurological patients
c. Defining and describing health behaviour
d. Causes of positive and negative health behaviours
e. Theories of behaviour and behaviour change for exercise health behaviour
f. Measurement of behaviour and behaviour change supported by modern technology.
g. Application of basic Behaviour change
h. Techniques for promoting positive healthy lifestyle behaviour.
i. Neurological Response and Adaptation to Exercise and Exercise related intervention

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5. Course Map (CO-PO Map)

Program Outcome / Course Outcome	PT 165 PO1	PT 165 PO2	PT 165 PO3	PT 165 PO4	PT 165 PO5
PT C 5 10 A CO1		2			
PT C 5 10 A CO2			2		
PT C 5 10 A CO3			1		
PT C 5 0 A CO4		3			
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution					

6. Course Teaching and Learning Methods

The Teaching and Learning Methods will include but not limited to:

Sl. No.	Teaching and Learning Methods	
1	**Lectures**	✓
2	**Seminars**	✓
3	**Group discussions**	✓
4	**Self-directed Learning**	✓
5	**Journal review meetings**	✓
6	**Demonstrations and Skill Labs**	✓
7	**Case Discussion and Presentation**	✓
8	**Patient Care in various settings**	✓
9	Field visits	
10	Inter disciplinary meetings and discussions	
11	Continuing Professional Development Programs	
12	Conferences / Workshop / Symposium programmes	
13	Research and Dissertation	

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Masters of Physiotherapy (MPT) Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document.

8. Course Resources

Recommended Books

Neuro Anatomy:

1. Bhuiyan PS, Rajgopal L, Shyamkishore K. Inderbir Singh's Textbook of Human

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Neurophysiology:

2. Hudspeth, A.J; Jessell, Thomas M.; Kandel, Eric R.; Schwartz, James H.; Siegelbaum, Steven A. Principles of neural science. 5th Edition. McGraw-Hill Medical, editors. New York: McGraw-hill; 2013. ISBN 13: 9780071390118

Pathophysiology:

3. Christopher M Fredericks; Lisa K Saladin Philadelphia. Pathophysiology of the motor systems: Principles and Clinical presentations. F.A. Davis, 1996.ISBN-13 : 978-0803600935

Motor Control:

4. Mark L. Latash.Neurophysiological Basis of Movement: 2nd Edition. Human Kinetics Publishers.2008. ISBN-10: 0736063676 ISBN-13 : 978-0736063678
5. James J. Gibson. The Ecological Approach to Visual Perception: Classic Edition. Psychology. Press & Routledge. 2014. ISBN-13: 978-1848725782

Motor Development:

6. Kathleen Haywood, Nancy Getchell. Life Span Motor Development 7th edition Human Kinetics Publishers 2019. ISBN: 9781492566908.
7. Smith, L. B., &Thelen E. Bradford Books series in cognitive psychology.A dynamic systems approach to development: Applications. MIT Press 1994. ISBN-10 : 0262519445

Motor Behavior:

8. Anne Shumway-Cook, Marjorie H. Woollacott. Translating Research into Clinical Practice.5th Edition.Wolters Kluwer. 2017. ISBN: 9781496302632, 14963026

Motor Learning:

9. Richard A. Magill, David I. Anderson. Motor learning and control: Concepts and Applications, 11th Edition. Mcgraw-hill Education. 2017. ISBN 978-1-259-82399-2.
10. Richard A. Schmidt, Tim Lee, CaroleeWinstein , Gabriele Wulf ,Howard N. Zelaznik. Motor Control and Learning A Behavioral Emphasis. 6th Edition. Human Kinetics PublishersISBN-13:978-1492547754

Behavior change:

11. American College of Sports Medicine. ACSM's Behavioral Aspects of Physical Activity and Exercise.Publisher: Lippincott Williams and Wilkins. 2013. ISBN-13: 978-1451132113.
12. Susan Michie, Lou Atkins, Robert West. The Behaviour Change Wheel: A Guide To Designing Interventions. Silverback Publishing. ISBN-10 : 1912141000 ISBN-13 : 978-1912141005

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Reorganization and recovery:

13. Krakauer JW, Carmichael ST. Broken movement: The Neurobiology of Motor Recovery after Stroke. MIT Press; 2017.ISBN-13 : 978-0262037228
14. Charles D. Ciccone. Pharmacology in Rehabilitation: Contemporary Perspectives in Rehabilitation. 5th Edition. F.A. Davis Company. 2015 ISBN-10 : 0803640293 ISBN-13 : 978-0803640290

9. Course Organization

Course Code	**PT C S 10 A**	
Course Title	**Foundations of Neurological Sciences**	
Course Leader's Name	Ramesh D V	
Course Leader's Contact Details	**Phone:**	9845544848
	E-mail:	Rameshdebur.rcp@msruas.ac.in
Course Specifications Approval Date	26.09.2022	
Next Course Specifications Review Date	01.07.2024	
Subsequent Course Specifications Review Date		

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Course 3: Assessment Approaches and Diagnosis in Neurological Physiotherapy

Course Title	Assessment Approaches and Diagnosis in Neurological Physiotherapy
Course Code	PT C 5 11 A
Course Type	Core Theory Course
Department	Neurological Sciences Physiotherapy
College	Physiotherapy

1. Course Summary:

This course is designed to educate the students to acquire adequate information and skills required to carry out Neurological assessment and information including investigations along with bringing out functional diagnosis in order to plan out and execute the physiotherapy management.

2. Course Size and Credits

Number of Credits	NA
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours	As per the Academic Regulations
Number of Weeks	As per the Academic Regulations
Department Responsible	Neurological Sciences Physiotherapy
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

On completion of the course, the postgraduate student will be able to

PT C 5 11 A CO1: Independently assess and diagnose movement dysfunction related to the field of neurorehabilitation

PT C 5 11 A CO2: Analyse and interpret Neurodiagnostic procedures in the context of movement dysfunction.

PT C 5 11 A CO3: Plan and perform Neuro electrophysiological studies towards a diagnosis of movement dysfunction

PT C 5 11 A CO4: Use an appropriate functional outcome measure to evaluate various neurological Disorders

4. Course Contents

1. **Assessment in neurological disorders**

   a) Assessment of Cortical function [Such as Consciousness, Higher Functions, Sensory functions, Perception, Motor functions, Synergy, Speech, Vision etc] and cortical dysfunction in Progressive and Non-progressive disorders of Central Nervous System Assessment of Subcortical function [Motor planning, Movement initiation and control, Muscle Tone]

   b) Assessment of Brain stem function and dysfunction [Cranial Nerve assessment, Brain stem

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Syndromes, Vestibular function and dysfunction]

c) Assessment of Cerebellar functions and dysfunction in cerebellar disorders [Such as Motor coordination, Sensory integration of visual, vestibular and proprioceptive systems]
d) Assessment of Spinal Cord function and dysfunction [Motor functions, Sensory functions, Reflexes and Autonomic functions]
e) Assessment of sensory, motor and autonomic dysfunction in peripheral nerve injuries, polyneuropathies, neuromuscular junction and muscle disorders
f) Functional Assessment of Balance and Gait

2. Neurological investigations

a) Electrophysiological investigations [EMG, SD curve and FG Test, Nerve conduction studies and Evoked Potentials]
b) Neuroimaging [Ultrasound, CT, MRI, FMRI, PET, TMS, EEG]
c) Biochemical [CSF, Muscle and Nerve Biopsy]

3. Motor Behaviour Assessment and diagnosis

a) Motor Control and Motor Behaviour Assessment and diagnosis in context to different environment
   i. Postural control assessment and diagnosis
   ii. Gait assessment and Other Gross movement assessment and diagnosis
   iii. Reach, Grasp and manipulation Assessment
   iv. Motor control and Motor Learning Assessment of motor tasks and functional activities utilizing performance measures and energetics
   v. Kinematic and kinetic analysis of motor tasks and functional activities and retention measures
b) Physical assessment and diagnosis of functions in in context to different environments
   i. Assessment of Activities and Instrumental activities of daily function
   ii. Assessment of Health Behaviors and Exercise adherence
   iii. Assessment of Environmental Barriers and Facilitators
   iv. Assessment of Personal Barriers and Facilitators

4. Functional Outcome Measures

a) Generic outcome measures
   i. Activities of Daily Living
   ii. Instrumental Activities of Daily Living
   iii. International Classification of Functioning Outcome measure
   iv. Participation Level Measure
   v. Quality of Life Measure
b) Disease Specific Measures relevant to Activity and Participation
   i. CNS Disorder including Movement Disorders and Cerebellar Disorders
   ii. Spinal Disorders

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iii. Peripheral Nerve and Muscle Disorders

c) Goal setting in progressive and non-progressive neurological disorders across ICF domain outcomes based on rate of prognosis.

d) Assessment for assistive technological interventions

5. Course Map (CO-PO-PSO Map)

Program Outcome / Course Outcome	PT 162 PO1	PT 162 PO2	PT 162 PO3	PT 162 PO4	PT 162 PO5
PT C 5 11 A CO1	1	3			
PT C 5 11 A CO2			2		
PT C 5 11 A CO3			3		
PT C 5 11 A CO4			3		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution					

6. Course Teaching and Learning Methods

The Teaching and Learning Methods will include but not limited to:

Sl. No.	Teaching and Learning Methods	
1	**Lectures**	✓
2	**Seminars**	✓
3	**Group discussions**	✓
4	**Self-directed Learning**	✓
5	**Journal review meetings**	✓
6	Demonstrations and Skill Labs	✓
7	**Case Discussion and Presentation**	✓
8	**Patient Care in various settings**	✓
9	Field visits	
10	**Inter disciplinary meetings and discussions**	✓
11	Continuing Professional Development Programs	
12	**Conferences / Workshop / Symposium programmes**	✓
13	Research and Dissertation	

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7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Masters of Physiotherapy (MPT) Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document.

8. Course Resources

Recommended Books

Basic Principles of assessment

1. Thomas B. Newman, Michael A. Kohn, Evidence-Based Diagnosis, Cambridge University Press, 2009. ISBN:9781139476850, 1139476858.
2. Rothstein JM, Echternach JL, Riddle DL. The Hypothesis-Oriented Algorithm for Clinicians II (HOAC II): a guide for patient management. Physical Therapy. 2003 May 1;83(5):455-70.
3. Anne Shumway-Cook, Marjorie H. Woollacott. Translating Research into Clinical Practice. 5th Edition.Wolters Kluwer. 2017. ISBN: 9781496302632, 14963026
4. World Health Organization. How to use the ICF: A practical manual for using the International Classification of Functioning, Disability and Health (ICF). Exposure draft for comment. October 2013. Geneva: WHO Assessment of Body structure and Function:
5. Kameshwar Prasad , Ravi Yadav , John Spillane. Bickerstaff's Neurological Examination in Clinical Practice. 7th adapted edition. Wiley India Pvt Ltd: 2013. ISBN- 8126538988ISBN-13 : 978 8126538980
6. Geraint Fuller. Neurological Examination Made Easy. 6th Edition. Elsevier. 2019 ISBN-10: 0702076279ISBN-13 : 978-0702076275
7. World Health Organization. How to use the ICF: A practical manual for using the International Classification of Functioning, Disability and Health (ICF). Exposure draft for comment. October 2013. Geneva: WHO

Investigation:

8. Jun Kimura. Electrodiagnosis in Diseases of Nerve and Muscle: Principles and Practice. 4th Edition. OUP USA: 2014. ISBN-10: 0199738688 ISBN-13 : 978-0199738687
9. U.K. Misra , J Kalita . Clinical Neurophysiology: Nerve Conduction, Electromyography, Evoked Potentials. 4th Edition. Elsevier India: 2019. ISBN-10 : 8131258157 ISBN-13 : 978-8131258156
10. Allan Ropper , Martin Samuels, Joshua Klein, Sashank Prasad. Adams and Victor's Principles of Neurology.11th Edition. McGraw-Hill Education / Medical: 2019. ISBN- 10: 0071842616 ISBN-13: 978-0071842617

Outcome measures:

11. Robert Herndon. Handbook of Neurologic Rating Scales. 2nd Edition. Demos Medical Publishing 2005ISBN-13 : 978-1888799927
12. Elspeth Finch. Physical Rehabilitation Outcome Measures: A Guide to Enhanced Clinical Decision Making.2nd Edition Springer Publishing Company 2002 ISBN:9780781742412
13. Measurement in Neurological Rehabilitation. By Derick T. Wade. 1992.

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Related scientific publications including position statements, guidelines, landmark trials, systematic reviews and meta-analysis and recent trials

9. Course Organization

Course Code	**PT C 5 11A**	
Course Title	**Assessment Approaches and Diagnosis in Neurological Physiotherapy**	
Course Leader's Name	Ramesh D V	
Course Leader's Contact Details	**Phone:**	9845544848
	E-mail:	Rameshdebur.rcp@msruas.ac.in
Course Specifications Approval Date	26.09.2022	
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Course 4: Physiotherapy Interventions in Neurological Disorders

Course Title	**Physiotherapy Interventions in Neurological Disorders**
Course Code	PT C 512 A
Course Type	Core Theory Course
Department	Physiotherapy
Faculty	Physiotherapy

1. Course Summary

This course integrates the clinical, academic and research components of Neuro-physiotherapy practice, with an emphasis on the management of patients with neurological disorders. It will develop an understanding of evidence-based practice and develop as an advanced physiotherapy practitioner. This program provides a unique opportunity for physiotherapists who wish to develop and extend their knowledge base and professional expertise in the field of neurological rehabilitation.

2. Course Size and Credits:

Number of Credits	NA
Credit Structure (Lecture: Tutorial: Practical)	NA
Total Hours	As per the Academic Regulations
Number of Weeks	As per the Academic Regulations
Department Responsible	Neurological Sciences Physiotherapy
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

On completion of the course, the postgraduate student will be able to

PT C 5 12 A CO1: Independently plan and implement interventions towards various neurological disorders

PT C 5 12 A CO2: Choose and perform an appropriate neurophysiological approach in restoring function in Neurological Disorders

PT C 5 12 A CO3: Choose and implement appropriate intervention including technology enabled tools towards a holistic approach in neurological rehabilitation

PT C 5 12 A CO4: Demonstrate an ability to choose and implement appropriate intervention to promote Neuroplasticity for improving functional motor behaviour.

4. Course Contents

1. **Interventions in Neurological disorders**
   a. Treatment of cerebral cortical dysfunction impairments affecting movement in Progressive and Non-progressive disorders of Central Nervous System.

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i. Interventions involving exercise, education, skill development and functions of the brain including Global and Specific mental functions.
ii. Training motor planning and control.
iii. Interventions including exercises for movement focusing on functions of motor reflex, involuntary movement reaction, control of voluntary movement, gait pattern functions and sensations related to muscles and movement.

b. Interventions for movement dysfunction and in movement disorders and cerebellar disorder
i. Interventions including exercises for inhibiting involuntary movement dysfunction and incoordination.
ii. intervention focused on initiating and controlling functions of voluntary movements such as cueing

c. Treatment of sensory, motor and autonomic dysfunction in Progressive and Non-progressive disorders of spinal cord, peripheral nerves, muscles and neuromuscular junction.
i. Training peripheral and central sensory functions.
ii. Electrical stimulation of muscle functions
iii. Training Autonomic functions through exercises and biofeedback
iv. Training control of central and peripheral sympathetic and parasympathetic functions

d. Treatment for Risk reduction of secondary impairments in all neurological disorders. Such as musculoskeletal, cardiopulmonary, integumentary and vascular system function
i. Functional Strength Training, Stretching Exercise, Aerobic exercise Planning and prescription, Wound management, Managing DVT, Relaxation Training.
e. Treatment for Risk reduction such as falls in conditions such as senility, prolonged inactivity, dementia, depression, polypharmacy, vestibular pathology, fall history etc.

2. Neurological Approaches and Technology enabled treatment techniques in retraining CNS and PNS disorders.
a. Understanding of Classical Approaches such as Rood, Bobath, NDT, Brunnstrom, PNF, MRP, TOT, CIMT etc. with their merits and demerits.
b. Retraining with Technology Based Interventions:
i. Virtual Reality,
ii. Robotic Therapy
iii. Functional Electrical Stimulation
iv. Brain and Spinal cord Stimulation
v. Brain computer interface training
vi. Neuro biofeedback therapy
vii. Assistive technology

3. Functional Interventions for Promoting Neuroplasticity for improving Motor Behaviour in various clinical disorders
a. Principles of Neuroplasticity and Motor learning
b. Motor Relearning Program
c. Systems Model of retraining postural control, locomotion and upper limb activities.
d. Task oriented and Functional Training for carrying out General tasks such as lifting and carrying objects, Mobility, self-care, domestic life, and Major life activities.
e. Action Observation training and Mirror Therapy

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4. Interventions for activity promotion and Participation Facilitation in various neurological disorders
   a. Behaviour Change Techniques for promoting positive health behaviour
   i. Training to influence health behaviours and exercise adherence
   ii. Education to influence health behaviours and exercise adherence.
   iii. Advocacy, Advising, counselling and emotional support for health behaviours
   b. Environmental Enrichment
   i. Prescription, Education, Advice, Training in the use of products and technology those adapted or specially designed to assist functioning such as orthotic and assistive devices and technology.
   ii. Capacity building interventions targeting aspects of natural environment and Human-made changes to environment such as environmental remodelling in their home environment.
   c. Social Environment Enrichment
   i. Providing education and advice about practical, physical or emotional support provided by people, to encourage a change of functioning, environment, attitude or behaviour in relation to health (or risks)

5. Intervention Planning and Prescription:
   a. Principles of Exercise prescription in Neurological Conditions

5. Course Map (CO-PO-PSO Map)

Program Outcome / Course Outcome	PT 162 PO1	PT 162 PO2	PT 162 PO3	PT 162 PO4	PT 162 PO5
PT C 5 12 A CO1		1	1		
PT C 5 12 A CO2		3			
PT C 5 12 A CO3			2	2	
PT C 5 12 A CO4					3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution					

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6. Course Teaching and Learning Methods

The Teaching and Learning Methods will include but not limited to:

Sl. No.	Teaching and Learning Methods	
1	**Lectures**	✓
2	**Seminars**	✓
3	**Group discussions**	✓
4	**Self-directed Learning**	✓
5	**Journal review meetings**	✓
6	Demonstrations and Skill Labs	✓
7	**Case Discussion and Presentation**	✓
8	**Patient Care in various settings**	✓
9	Field visits	✓
10	**Inter disciplinary meetings and discussions**	✓
11	**Continuing Professional Development Programs**	✓
12	**Conferences / Workshop / Symposium programmes**	✓
13	Research and Dissertation (EBP)	✓

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Masters of Physiotherapy (MPT) Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document.

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8. Course Resources

Recommended Books

Retraining Body Function

1. Susan B.O'Sullivan, Thomas J. Schmitz, George D. Fulk. Physical Rehabilitation. 7thEdition. F.A. Davis Company: 2019. ISBN-10: 0803661622 ISBN-13: 978-0803661622
2. Rolando T. Lazaro .Umphred's Neurological Rehabilitation. 7th Edition. Mosby: 2020.ISBN-10: 0323611176 ISBN-13: 978-0323611176
3. Jacqueline Montgomery. Physical Therapy for Traumatic Brain Injury: Clinics in Physical Therapy. Churchill Livingstone: 1994. ISBN-10: 0443089086 ISBN-13:978-0443089084
4. Meg E. Morris, Robert Iansek. Rehabilitation in Movement Disorders. Cambridge University Press 2013 ISBN: 9781107014008, 110701400X Neurological Approaches and Rehabilitation Technology
5. Raj Samuel Glady. Physiotherapy in Neuroconditons. Jaypee Brothers Medical Publishers. ISBN: 9788180616310, 9788180616310

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6. University Press 2013 ISBN: 9781107014008, 110701400X Neurological Approaches and Rehabilitation Technology
7. Raj Samuel Glady. Physiotherapy in Neuroconditons. Jaypee Brothers Medical Publishers. ISBN: 9788180616310, 9788180616310
8. David J. Reinkensmeyer, Volker Dietz,Neurorehabilitation Technology 2nd Edition. Springer International Publishing. 2016. ISBN: 9783319286037, 331928603X Motor Behavior Retraining
9. Joel Stein, Richard L. Harvey, Richard D. Zorowitz , Carolee J. Winstein, George E. Wittenberg. Stroke Recovery and Rehabilitation. 2nd Edition. Demos Medical Publishing:2014.ISBN-10:1620700069 ISBN-13: 978-1620700068
10. Janet H. Carr, Roberta B. Shepherd. Neurological Rehabilitation: Optimizing motor performance. 2nd Edition. Churchill Livingstone: 2010. ISBN-10: 0702040517. ISBN 13: 978-0702040511
11. Anne Shumway-Cook, Marjorie H. Woollacott. Motor Control Translating Research into Clinical Practice. 5th Edition.Wolters Kluwer. 2017. ISBN: 9781496302632, 149630263X

Activity promotion

12. Susan Michie, Lou Atkins, Robert West. The Behaviour Change Wheel: A Guide To Designing Interventions. Silverback Publishing. ISBN-10 : 1912141000 ISBN-13 : 978-1912141005
13. URL - https://www.who.int/classifications/icf/en/

Recommended Journals

1. Journal of Neurologic Physical Therapy
2. Journal of Motor Behavior
3. Stroke
4. The Journal of Spinal cord Medicine
5. Journal of Parkinson's disease
6. Human Movement Science
7. Gait and Posture
8. Motor Control
9. Neural plasticity
10. Neuro-rehabilitation
11. Neuro-rehabilitation and Neural repair
12. Journal of neuro- e n g i n e e r i n g and rehabilitation
13. Disability and Rehabilitation
14. African journal of disability
15. International Journal of Behavioral Nutrition and Physical activity
16. International journal of Stroke
17. Movement Disorders
18. Parkinsonism and related disorders
19. Journal of Head Trauma Rehabilitation
20. Topics in spinal cord Injury Rehabilitation
21. Neuromuscular disorders
22. Neurology Asia
23. Neurology India

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9. Course Organization

Course Code	**PT C 5 12 A**	
Course Title	**Physiotherapy Interventions in Neurological Disorders**	
Course Leader's Name	Ramesh D V	
Course Leader's Contact Details	**Phone:**	9845544848
	E-mail:	Rameshdcbur.rcp@msruas.ac.in
Course Specifications Approval Date	26.09.2022	
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Annexure 1

Program electives

Biomedical research (PT E 5 01 A) - Encompasses application such as devices, drug trials which are not covered under research syllabus as they are not integral to the programme outcomes. This course aims to provide the student an opportunity to understand research applications in the fields of the bio-physical sciences as well as an insight into clinical research.

Basic Life Support (PT E 5 02 A) - As a clinician in the field, a physiotherapist is expected to be competent in all life saving procedures. As the syllabus is more focussed towards the practice of physiotherapeutics, this course shall ensure that a physiotherapist is competent to deliver basic life support in case of an emergency. Furthermore, the certification is required to be a independent clinical practitioner.

Professional Ethics (PT E 5 03 A) – This module aims to augment the practice of ethics and professionalism as delivered in the main course. This course shall be done on a continuous basis along with other courses so as to leverage the experience gain by the students in clinical postings toward further development of professional ethi

Open elective

Advanced Life Support (PT O 5 01 A)– This course aims to provide training on a set of life saving skills that extends beyond BLS. It is for health care professionals who either direct or participate in the management of cardiac emergencies such as cardiac arrest, stroke, myocardial infarction. It is provided by American Heart Association.

Medico legal aspects in patient care (PT O 5 02 A)– The course aims to equip the students in the basic understanding of medico legal jurisprudence so as to improve the understanding of the legal implications of day-to-day practice and the knowledge of consumer laws.

Quality management in health care (PT O 5 03 A)– This course aims to provide an overview of design, policies and processes that can minimize harm and optimize patient care and outcome.

Financial Literacy (PT O 5 04 A)– This course aims to provide the foundation for effective financial decision making with their financial resources. Financial literacy makes the student confident in understanding the concepts of saving, investing and debt that leads to an overall sense of financial well-being and self-trust.

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