स्वामी राम हिमालयन विश्वविद्यालय
Swami Rama Himalayan University

Criterion 1 - Curricular Aspects

1.1.1 Outcome Analysis of POs, COs

M.Sc. Clinical Research

(2021-2023)

Himalayan Institute of Medical Sciences

Swami Rama Nagar, Jolly Grant, Dehradun 248016, Uttarakhand, India

A. Program Outcomes

After successful completion of the program, graduating students/graduates will able to:

PO1	Basic Researcher & critical thinker, who thinks critically and develop power of reasoning in research.
PO2	Data manager, as an active member of the research team, they will be able to Analyze and Manage Clinical Data & Big Data in pharmaceutical industries /Healthcare settings.
PO3	Professional, who adhere Good Practices in scientific investigations & clinical trials dealing with drugs, diseases and medical devices
PO4	Communicator, work efficiently in teams to meet organizational and societal goals communicating effectively with stake holders with sensitivity and ethical awareness
PO5	Lifelong learner committed to continuous improvement of skills & knowledge in Quantitative tools & techniques in Health Care including Bio/ Pharmaco /Medico-Informatics, and basic Drug designing.

B. Course-wise CO-PO Mapping

Mapping factor or Correlational level between Course Outcome (CO) and Program Outcomes (PO) indicates to what extent the teaching and assessment method of CO correlates/contributes the PO at the level defined below:

Corelation Level	Particulars
3	Substantial/high contribution of CO towards PO
2	Moderate contribution of CO towards PO
1	Slight/low contribution of CO towards PO

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR501	Biostatsics					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Apply basic statistical concepts commonly used in Health and Medical Sciences	3	3	3	1	1
CO2	Use basic analytical techniques to generate results	3	3	3	1	1
CO3	Interpret results of commonly used statistical analyses in written summaries	3	3	2		2
CO4	Demonstrate statistical reasoning skills correctly and contextually	3	3	3		2
	Course-wise PO Average	**3.000**	**3.000**	**2.750**	**0.500**	**1.500**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR502	General Biochemistry					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Demonstrate knowledge and understanding of the principles that govern the structures of macromolecules, basic mechanisms of metabolic control and their participation in molecular recognition	3	3	3	1	1
CO 02	Use basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments	3	3	3	3	3
CO 03	Analyze, interpret, and report the results of their laboratory experiments	3	3	3	3	[illegible]
	Course-wise PO Average	**3.000**	**3.000**	**3.000**	**2.[illegible]**	**1.667**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR503	Molecular Biology; Genetics					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Discuss the fundamental laws, discoveries, assumptions of genetics and the characteristic features of Nucleic acids & its analysis.	3	1	3	1	1
CO2	Describe the recent development, scopes and applications of molecular biology and genetics and its role in human society.	3	1	3		2
CO3	Demonstrate the types, principle and applications of various molecular biology laboratory equipment like nucleic acid isolation, characterization & analysis using electrophoresis, staining, restriction digestion & gel documentation.	3	1	3	1	2
	Course-wise PO Average	**3.000**	**1.000**	**3.000**	**0.667**	**1.667**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR504	Introduction to Clinical Research					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Describe principles and processes in Clinical Research.	3	1	2	1	1
CO 02	Explain the inter and cross-disciplinary nature of investigations in Clinical science, Epidemiology and Pharmacology.	3	3	3	1	1
CO 03	Discuss the importance of Clinical Research in developing new techniques for disease diagnosis, new drugs, new surgical methods, new therapeutic approaches including Gene therapy, and, new combinations & devices	3	3	3	1	1
CO 04	Gain knowledge of various phases and kinds of clinical trials,	3	2	3	3	1
CO 05	Understand the code of ethics and regulatory guidelines and also modern biomedicine, i.e., frontline areas of medical biotechnology.	3	2	3	2	1
CO 06	Prepare technical document (protocol, ICD, CRF, SOPs) and handling of clinical data	3	3	3	1	1
CO 07	Understand the knowledge of Good Clinical Practices, Good Laboratory Practices, Good Manufacturing Practices	3	2	3	2	1
	Course-wise PO Average	**3.000**	**2.286**	**2.857**	**1.571**	**1.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR505	Bio-medical, Bio-analytical Techniques & Instrumentation					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Understand the knowledge of commonly used techniques e.g. histology, histochemistry, immunohistochemistry (IHC), fluorescent microscopy, cell culture, genetically modified (GM) cells, monoclonal antibodies (MAbs), polymerase chain reaction (PCR), ELISA, RIA, ECLIA	3	1	3	1	1
CO 02	Knowledge of the types and principles of analytical techniques like centrifugation, spectroscopy, electrophoresis and chromatographic systems	3	1	3	1	1
CO 03	Demonstration of Immuno-diagnostic and PCR workstations.	3	1	3	1	1
CO 04	Describe the applications of Biomedical and Bio-analytical techniques in industry & R&D area in healthcare.	3	2	3	1	1
	Course-wise PO Average	**3.000**	**1.250**	**3.000**	**1.000**	**1.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR506	General Epidemiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Describe the basic concepts of health, wellbeing, diseases, control, prevention,	3	3	2	2	2
CO 02	Describe the basic concepts of health, wellbeing, diseases, control, prevention,	3	3	2	1	2
CO 03	Demonstrate the understanding of the modes of intervention in prevention of diseases.	3	3	2	1	1
CO 04	Demonstrate the concepts, determinants and prevalence of diseases in human populations using epidemiological concept	3	3	2	1	1
	Course-wise PO Average	**3.000**	**3.000**	**2.000**	**1.250**	**1.500**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CDLa101	Spoken English					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Devcloping intellectual, personal and professional abilities through effective communicative skills	3	1	3	3	1
CO 02	Command of English and its linguistic Structures.	3	1	3	3	1
CO 03	Critical frameworks to analyze the linguistic, cultural and historical background of texts written in English	3	1	3	3	1
	Course-wise PO Average	**3.000**	**1.000**	**3.000**	**3.000**	**1.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR511	Clinical Trials					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Apply knowledge of Clinical trials and their importance in human welfare	3	1	3	1	1
CO 02	Demonstrate knowledge of new drug discovery and development (vide USFADA/DCGI etc guidelines)	3	1	3	1	1
CO 03	Describe Types and different phases of clinical trials.	3	1	3	1	1
CO 04	Apply the concept of audit and monitoring as per regulatory guidelines	3	1	3	1	1
CO 05	Explain the role of members participating in Clinical trials & coordinate with them in trials.	3	1	3	1	1
CO 06	Design Case Report Forms, SOPs and write preliminary reports etc	3	3	3	1	1
CO 07	Concern about the effectiveness and safety of medications or medical devices or biologicals etc as per regulatory requirements	3	1	3	1	1
	Course-wise PO Average	**3.000**	**1.286**	**3.000**	**1.000**	**1.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR512	Pharmacology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Differtiate the components of Pharmacology viz. Pharmacokinetics, Pharmacodynamics, Pharmacotherapeutics, Toxicology	3	1	2	1	1
CO 02	Define drug nomenclature, and kinds and sources of drugs	3	1	1	1	1
CO 03	Classify drugs according to chemical structure, effect, mechanism of action and therapeutic use	3	1	2	1	1
CO 04	Comprehend Absorption, Distribution, Metabolism and Excretion (ADME) of drugs in the body and the concept of half-life (Pharmacokinetics).	3	1	2	1	1
CO 05	Describe the effect of drugs on the body in terms of drug response, drug receptors, mechanism of action (Pharmacodynamics)	3	1	1	1	1
CO 06	Explain toxicity and adverse effects of drugs (Pharmacovigilance)	3	1	2	1	1
CO 07	Describe the routes of drug administration vis-à-vis absorption	3	1	1	1	1
CO 08	Demonstrate knowledge of new drug discovery and development (as per USFADA/DCGI etc guidelines)	3	1	2	1	1
CO 09	Appreciate recent advances in Bio-Informatics and Omics (Genomics, Proteomics, Systems Biol/Pharmacol) and their importance in drug discovery and therapeutics.	3	1	2	1	1
CO 10	Discuss the global drug-safety monitoring systems	3	1	1	1	1
	Course-wise PO Average	**3.000**	**1.000**	**1.600**	**1.000**	**1.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR513	Immunology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Explain mechanisms of infection and related immune reactions in body	3	1	1	1	1
CO 02	Know the basis of producing vaccines, antibodies for use in healthcare	2	1	1		
CO 03	Describe how immunological techniques are used in diagnostics and research.	2	1	1	1	
	Course-wise PO Average	**2.333**	**1.000**	**1.000**	**1.000**	**1.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR516	Clinical Data Management					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Understanding of quality data management and metrics and best practices for quality data management.	2	3	3	1	3
CO 02	Familiarity with CDM processes, Data collection modalities, Electronic data capture, Storage, Retrieval and validation.	3	3	3	1	2
CO 03	Application of data, data preparation and discrepancy management	3	3	3	1	2
	Course-wise PO Average	**2.667**	**3.000**	**3.000**	**1.000**	**2.333**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR517	Environmental & Regulatory Physiology					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Understanding of environment- organism interfacing and how physiological mechanisms help adjust to the challenges posed by a varied and cyclically fluctuating environment (life strategies, environmental cues (using life strategies as examples from plants, animals and humans)	3	1	1		3
CO 02	Understanding of the role of regulatory systems viz., neuronal and hormonal messengers, in integration & coordination of body functions and behavior in maintaining the information flow among organism & surroundings	3	1	2	2	2
CO 03	Demonstrate functioning of neuronal and hormonal mechanisms at systems, cellular and molecular level- synthesis, modes of action, application.	3	1	2	2	2
	Course-wise PO Average	**3.000**	**1.000**	**1.667**	**1.333**	**2.333**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR518	Introduction to Pharmaceutical Sciences					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Demonstrate basic understanding of preparation, manufacturing and packaging of pharmaceutical dosage forms.	3	1	3	1	2
CO 02	Explain basic principles of formulation of pharmaceutical dosages with knowledge of their physicochemical properties	3	1	3	1	2
CO 03	Explain basic steps of converting raw material into finished goods in manufacturing pharmaceutical dosage forms.	3	1	3	1	3
CO 04	Describe the evaluation process to ensure quality of dosage forms.	3	1	3	1	2
CO 05	Describe Current Good Manufacturing Practice (cGMP) and its compliance in Pharmaceutical Industry.	3	1	3	1	2
	Course-wise PO Average	**3.000**	**1.000**	**3.000**	**1.000**	**2.200**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CDSs101	Population Studies					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Give knoweldge of key population issues in India, other developing countries, less developed and developed countries.	3	3	2	1	1
CO 02	Demonstate the relationships between population size and available resources; social, biological and economic influences on population growth rates, fertility decline and population ageing, and population distribution and migration.	3	3	2	1	1
CO 03	Introduced to the main theories used to understand population and societal change	3	3	2	1	1
	Course-wise PO Average	**3.000**	**3.000**	**2.000**	**1.000**	**1.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR601	Biopharmaceuticals & Drug Development					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Knowledge of Biopharmaceuticals and Drug development process	3	1	3	2	2
CO 02	Knowledge of development, research and production of pharmaceutical products	3	1	3	2	2
CO 03	Awareness of pharmaceutical biotechnology as applied to health problems	3	1	3	1	2
	Course-wise PO Average	**3.000**	**1.000**	**3.000**	**1.667**	**2.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR602	Quality control & Quality Assurance in Clinical Research					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Deep understanding of the concept of Quality, Quality system, Quality management, Quality assurance, Audit, Monitoring	3	1	3	2	2
CO 02	Application of Standard operating procedures (SOPs), and Good practices e.g. Good Clinical Practice (GCP), Good Manufacturing Practice (GMP), Good Regulatory Practice (GRP)	2	2	3	1	2
CO 03	Deep understanding of periodic Quality control (QC) measures in Healthcare industry ensuring adequate data generation, collection, handling, analysis, reporting & monitoring in accordance with research plan /protocol, SOPs and Good Practices.	2	2	3	1	2
CO 04	Knowledge of Regulatory compliances as per applicable to various stakeholders	1	1	3	1	2
	Course-wise PO Average	**2.000**	**1.500**	**3.000**	**1.250**	**2.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR603	**Regulatory Affairs**					
CO#	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO 01	Knowledge of Good Regulatory Practice	2	1	3	1	1
CO 02	Knowledge Drug Regulatory authorities and agencies (Indian and global)	2	1	3	1	1
CO 03	Explain Quality Standards for Regulatory Bodies	2	1	3	1	1
CO 04	Describe Regulatory aspects of Clinical trials	2	1	3	1	1
CO 05	Discuss Natural Health Products, and Innovative, Generic & Hybrid Medicinal Products and their Approval processes	1	1	3	1	1
CO 06	Explain Regulatory aspects of Biotechnology Products (Advanced Therapy Medicinal Products, ATMPs)	2	1	3	1	1
CO 07	Explain Regulatory aspects of medical devices	2	1	3	1	1
CO 08	The impact of medicines legislative requirements on regulatory activities within a pharmaceutical company.	1	1	3	1	1
CO 09	The importance of ethics, integrity & responsibility in the profession	1	1	3	1	1
	Course-wise PO Average	**1.667**	**1.000**	**3.000**	**1.000**	**1.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR604	**Introduction to Clinical & Pharmaco-Epidemiology**					
CO#	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO 01	Define patterns, causes and effects of disorder/ disease in patient populations and association with exposures/ treatments and Health outcomes	3	2	1	1	1
CO 02	Define patterns and impact of environmental deficiencies e.g. micronutrients on human populations.	3	2	1	1	1
CO 03	Generate statistics of Public health issues in local populations and appreciate the importance of Practices,	3	3	1	1	1
CO 04	Guidelines and Policies in health systems	3	1	3	1	2
CO 05	Describe disease screening and prevention	3	1	[illegible]	[illegible]	2

CO 06	Gain expertise in systematic review methodology	3	2	2	1	3
CO 07	Develop patient-centered registries and data marts within health information systems	3	3	1	1	2
CO 08	Appreciate etymology of epidemics nationally and globally	3	3	1	1	3
CO 09	Define Pharmacocpidemiology as the bridge sciencc spanning both Pharmacology & Epidemiology	3	2	1	1	2
	Course-wise PO Average	**3.000**	**2.111**	**1.333**	**1.000**	**1.889**

Course Code	**Course Title**	**CO-PO Mapping (Articulation Matrix)**				
CMCR605	**Research Methodology**					
CO#	At the end of the course the students will be able to:	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO 01	Understanding of the importance of research in societal growth and development	3	3	2	1	3
CO 02	Ability to identify original problems for research and develop research designs for problem solving	3	3	3	1	2
CO 03	Familiarity with research methodologies i.e. surveys, sampling, experimental, in clinical investigations	3	3	3	1	2
CO 04	Understanding of ethical and regulatory issues in scientific research	3	3	3	1	2
CO 05	Adequate skill in statistical tools, techniques and their application to arrive at relevant conclusions	3	3	2	1	2
CO 06	Adequate skill in basic software used in data collection, compilation, storage, retrieval and data analysis.	3	3	3	1	2
	Course-wise PO Average	**3.000**	**3.000**	**2.667**	**1.000**	**2.167**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR606	Pharmacovigilance					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Discuss the classification of adverse events / adverse drug reactions & reporting of ADRs	3	3	3	1	2
CO 02	Describe the safety reporting requirements (according to the type of adverse event / reaction) pre- and post-approval.	3	3	3	1	2
CO 03	Describe the reporting of periodic safety update reports (PSUR)	3	3	3	1	1
CO 04	Understanding of ongoing benefit / risk assessment throughout the life-cycle of a medicine.	3	3	3	1	2
CO 05	Understand of the role of Pharmacoepidemiology in the life-cycle management of a medicine.	3	3	3	1	2
	Course-wise PO Average	**3.000**	**3.000**	**3.000**	**1.000**	**1.800**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR652	Pharmacovigilance Elective Level I					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Describe the safety reporting requirements (according to the type of adverse event / reaction) pre- and post-approval.	3	3	3	1	2
CO 02	Describe the safety reporting requirements (according to the type of adverse event / reaction) pre- and post-approval.	3	3	3	1	2
	Course-wise PO Average	**3.000**	**3.000**	**3.000**	**1.000**	**2.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR656	Clinical Data Integration and Analysis Elective Level I					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Apprises students with the various methods & statistical procedures of mining, management and analysis of clinical studies based data.	3	3	2	1	2
CO 02	become conversant in CDM processes, data management and validation plans	3	3	2	1	2
CO 03	Use statistical tools and techniques in data management and analysis	3	3	2	1	2
CO 04	Design surveys and develop independent projects	3	3	2	1	2
CO 05	Application of data, data preparation and discrepancy management	3	3	2	1	2
	Course-wise PO Average	**3.000**	**3.000**	**2.000**	**1.000**	**2.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR657	Clinical Trial Management Elective Level I					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	Learn the process for managing biomedical product development for FDA approval	3	2	1	1	1
CO2	Gain an in-depth understanding of the clinical trials process through a modular, operations-focus approach	3	2	3	1	2
CO3	Acquire project management skills needed to successfully manage human clinical trials	3	2	3	1	2
CO4	Gain a global perspective on clinical trials management to better respond to the growing industry across the globe	3	2	3	1	2
CO5	Gain practical knowledge through real-world case studies and team projects in product development	3	2	3	1	2
CO6	Learn from instructors with industry expertise in clinical trials management	3	2	3	1	2
	Course-wise PO Average	**3.000**	**2.000**	**2.667**	**1.000**	**1.833**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR650	Research Project					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	get hold of principles and hands on relevant techniques of biomedical research viz disease genesis, diagnostics & amp; management	3	3	3	1	2
CO 02	be able to prepare technical document(protocol, informed consent, clinical report form, clinical study report)	3	3	3	1	2
CO 03	be well with wet/dry lab methodologies and field activity	3	3	3	1	2
CO 04	get knowledge for data generation, integration & statistical analysis using SW.	3	3	3	1	2
CO 05	be able to design and interpret clinical case study, using medico informatics tools	3	3	3	1	2
	Course-wise PO Average	**3.000**	**3.000**	**3.000**	**1.000**	**2.000**

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR700	Dissertation					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO1	learns to address issues with a problem-solving approach developing a power of reasoning	3	3	3	1	1
CO2	Student is also acquainted with wet/dry lab methodologies and field activity gaining expertise in a Advanced Techniques in relevant area.	3	3	3	1	1
CO3	Perform statistical analysis.	3	3	3	1	1
CO4	student gets to learn, hands-on application of Statistical and Bioinformatics/, Medico-informatics tools	3	3	3	1	1
CO5	student is initiated into Scientific writing skills with periodic précis of primary research papers and final report	3	3	3	1	1
	Course-wise PO Average	**3.000**	**3.000**	**3.000**	**1.000**	**1.000**

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Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR652	Pharmacovigilance Elective Level II					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Describe the safety reporting requirements (according to the type of adverse event / reaction) pre- and post-approval.	3	3	3	1	2
CO 02	Describe the safety reporting requirements (according to the type of adverse event / reaction) pre- and post-approval.	3	3	3	1	2
	Course-wise PO Average	3.000	3.000	3.000	1.000	2.000

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR656	Clinical Data Integration and Analysis Elective Level II					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Apprises students with the various methods & statistical procedures of mining, management and analysis of clinical studies based data.	3	3	2	1	2
CO 02	become conversant in CDM processes, data management and validation plans	3	3	2	1	2
CO 03	Use statistical tools and techniques in data management and analysis	3	3	2	1	2
CO 04	Design surveys and develop independent projects	3	3	2	1	2
CO 05	Application of data, data preparation and discrepancy management	3	3	2	1	2
	Course-wise PO Average	3.000	3.000	2.000	1.000	2.000

Course Code	Course Title	CO-PO Mapping (Articulation Matrix)				
CMCR657	Clinical Trial Management Elective Level II					
CO#	At the end of the course the students will be able to:	PO1	PO2	PO3	PO4	PO5
CO 01	Learn the process for managing biomedical product development for FDA approval	3	2	3	1	2
CO 02	Gain an in-depth understanding of the clinical trials process through a modular, operations-focus approach	3	2	3	1	2
CO 03	Acquire project management skills needed to successfully manage human clinical trials	3	2	3	1	2
CO 04	Gain a global perspective on clinical trials management to better respond to the growing industry across the globe	3	2	3	1	2
CO 05	Gain practical knowledge through real-world case studies and team projects in product development	3	2	3	1	2
CO 06	Learn from instructors with industry expertise in clinical trials management	3	2	3	1	2
	Course-wise PO Average	**3.000**	**2.000**	**3.000**	**1.000**	**2.000**

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C. Program Outcome Reference Values:

Following table calculates the overall average of all POs of the Courses and is referred as Course-wise Average of POs Reference values.

SR. No.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5
1	CMCR501	Biostatsics	3.000	3.000	2.750	0.500	1.500
2	CMCR502	General Biochemistry	3.000	3.000	3.000	2.333	1.667
3	CMCR503	Molecular Biology; Genetics	3.000	1.000	3.000	0.667	1.667
4	CMCR504	Introduction to Clinical Research	3.000	2.286	2.857	1.571	1.000
5	CMCR505	Bio-medical, Bio-analytical Techniques & Instrumentation	3.000	1.250	3.000	1.000	1.000
6	CMCR506	General Epidemiology	3.000	3.000	2.000	1.250	1.500
7	CDLa101	Spoken English	3.000	1.000	3.000	3.000	1.000
8	CMCR511	Clinical Trials	3.000	1.286	3.000	1.000	1.000
9	CMCR512	Pharmacology	3.000	1.000	1.600	1.000	1.000
10	CMCR513	Immunology	2.333	1.000	1.000	1.000	1.000
11	CMCR516	Clinical Data Management	2.667	3.000	3.000	1.000	2.333
12	CMCR517	Environmental & Regulatory Physiology	3.000	1.000	1.667	1.333	2.333
13	CMCR518	Introduction to Pharmaceutical Sciences	3.000	1.000	3.000	1.000	2.200
14	CDSs101	Population Studies	3.000	3.000	2.000	1.000	1.000

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15	CMCR601	Biopharmaceuticals & Drug Development	3.000	1.000	3.000	1.667	2.000
16	CMCR602	Quality control & Quality Assurance in Clinical Research	2.000	1.500	3.000	1.250	2.000
17	CMCR603	Regulatory Affairs	1.667	1.000	3.000	1.000	1.000
18	CMCR604	Introduction to Clinical & Pharmaco-Epidemiology	3.000	2.111	1.333	1.000	1.889
19	CMCR605	Research Methodology	3.000	3.000	2.667	1.000	2.167
20	CMCR606	Pharmacovigilance	3.000	3.000	3.000	1.000	1.800
21	CMCR656	Clinical Data Integration and Analysis Elective Level I	3.000	3.000	2.000	1.000	2.000
22	CMCR657	Clinical Trial Management Elective Level I	3.000	2.000	2.667	1.000	1.833
23	CMCR650	Research Project	3.000	3.000	3.000	1.000	2.000
24	CMCR700	Dissertation	3.000	3.000	3.000	1.000	1.000
25	CMCR652	Pharmacovigilance Elective Level II	3.000	3.000	3.000	1.000	2.000
26	CMCR656	Clinical Data Integration and Analysis Elective Level II	3.000	3.000	2.000	1.000	2.000
27	CMCR657	Clinical Trial Management Elective Level II	3.000	2.000	3.000	1.000	2.000
Combined Course-wise Average of POs Reference values			**2.877**	**2.090**	**2.576**	**1.169**	**1.626**

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D. Assessment of CO and PO Attainment Value

The attainment of the course outcome is measured at the level of 3 as follows:

Attainment Levels	Criteria
3	If **80%** of student achieves marks **greater** than threshold percentage of the total score of assessment
2	If **70%** of student achieves marks **greater** than threshold percentage of the total score of assessment
1	If **60%** of student achieves marks **greater** than threshold percentage of the total score of assessment
0	If **60%** of student achieves marks **less** than threshold percentage of the total score of assessment

Attainment level of COs is measured through direct attainment of COs depending on the performance of the students in Internal Assessment (IA) and End Semester Examination (ESE) individually. For the program the threshold percentage is set at 50% for ESE and 60% for IA. assessments. The weightage of attainments for IA and ESE is in proportion of 40:60.

Sr. No.	Course Code	Course Title	Attainment of COs	Derived Attainment of POs Course-wise				
				PO1	PO2	PO3	PO4	PO5
1	CMCR501	Biostatsics	**1.800**	1.800	1.800	1.650	0.300	0.900
2	CMCR502	General Biochemistry	**1.200**	1.200	1.200	1.200	0.933	0.667
3	CMCR503	Molecular Biology; Genetics	**3.000**	3.000	1.000	3.000	0.667	1.667
4	CMCR504	Introduction to Clinical Research	**3.000**	3.000	2.286	2.857	1.571	1.000
5	CMCR505	Bio-medical, Bio-analytical Techniques & Instrumentation	**1.200**	1.200	0.500	1.200	0.400	0.400
6	CMCR506	General Epidemiology	**3.000**	3.000	3.000	2.000	1.250	1.500
7	CDLal01	Spoken English	**3.000**	3.000	1.000	3.000	3.000	1.000
8	CMCR511	Clinical Trials	**1.200**	1.200	0.514	1.200	0.400	0.400

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9	CMCR512	Pharmacology	**1.200**	1.200	0.400	0.640	0.400	0.400
10	CMCR513	Immunology	**1.800**	1.400	0.600	0.600	0.600	0.600
11	CMCR516	Clinical Data Management	**1.200**	1.067	1.200	1.200	0.400	0.933
12	CMCR517	Environmental & Regulatory Physiology	**1.800**	1.800	0.600	1.000	0.800	1.400
13	CMCR518	Introduction to Pharmaceutical Sciences	**1.800**	1.800	0.600	1.800	0.600	1.320
14	CDSs101	Population Studies	**1.200**	1.200	1.200	0.800	0.400	0.400
15	CMCR601	Biopharmaceuticals & Drug Development	**3.000**	3.000	1.000	3.000	1.667	2.000
16	CMCR602	Quality control & Quality Assurance in Clinical Research	**3.000**	2.000	1.500	3.000	1.250	2.000
17	CMCR603	Regulatory Affairs	**3.000**	1.667	1.000	3.000	1.000	1.000
18	CMCR604	Introduction to Clinical & Pharmaco-Epidemiology	**2.500**	2.500	1.759	1.111	0.833	1.574
19	CMCR605	Research Methodology	**3.000**	3.000	3.000	2.667	1.000	2.167
20	CMCR606	Pharmacovigilance	**3.000**	3.000	3.000	3.000	1.000	1.800
21	CMCR656	Clinical Data Integration and Analysis Elective Level I	**1.500**	1.500	1.500	1.000	0.500	1.000
22	CMCR657	Clinical Trial Management Elective Level I	**1.500**	1.500	1.000	1.334	0.500	0.917
23	CMCR650	Research Project	**1.500**	1.500	1.500	1.500	0.500	1.000
24	CMCR700	Dissertation	**1.500**	1.500	1.500	1.500	0.500	0.500

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25	CMCR652	Pharmacovigilance Elective Level II	**1.500**	1.500	1.500	1.500	0.500	1.000
26	CMCR656	Clinical Data Integration and Analysis Elective Level II	**1.500**	1.500	1.500	1.000	0.500	1.000
27	CMCR657	Clinical Trial Management Elective Level II	**1.500**	1.500	1.000	1.500	0.500	1.000
Course-wise Average of POs Achievement Through Results				**2.002**	**1.348**	**1.830**	**0.885**	**1.138**
Course-wise Average of POs Reference values				**2.877**	**2.090**	**2.576**	**1.169**	**1.626**
Percentage Attainment of PO's				**69.6%**	**64.5%**	**71.0%**	**75.7%**	**70.0%**

From the Attainment level of CO, the Derived PO's value for course is calculated as follows:

$$Derived\ PO\ Value = \frac{CO\ attaintment \times respective\ PO\ average}{3}$$

Depending on derived PO values of the courses, calculate the Course-wise Average of POs achievement for each PO.
Calculate the percentage attainment of PO's as follows:

$$Percentage\ attainment\ of\ PO's = \frac{Average\ PO\ Attainment\ through}{average\ PO\ refrenece\ value} \times 100$$

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