M.PHARMACY COURSE OUTCOMES (PCI Pattern)			
Subject Code	**Subject**	**Course Outcome Number**	**Course Outcome**
MPAT101T	Modern Pharmaceutical Analytical Techniques	**The student will be able to**	
		1	Demonstrate understanding on the working principle of different analytical techniques (spectroscopy, chromatography, electrophoresis, X ray Crystallography, Potentiometry and Thermal Techniques) and recognize their advantages and limitations.
		2	Explain the instrumentation and working of the spectrophotometers, chromatographic instruments, Electrophoresis, X ray Crystallography, Potentiometry and Thermal Techniques.
		3	Interpret the UV-vis, IR, NMR and Mass spectra of various organic compounds and elucidate the structure of unknown organic compounds using combined spectroscopic data.
		4	Analyze various drugs in single and combination dosage forms by spectrophotometric, chromatographic, potentiometric and electrophoresis techniques.
		5	Analyze and integrate the data from X ray Crystallography and thermal techniques (DSC, DTA and TGA) for the characterization of API and formulations.
MPH102T	Drug Delivery Systems	**The student will be able to**	
		1	Design formulation, fabrication and evaluation of sustained, controlled and rate controlled, gastro- retentive, buccal, ocular, transdermal and protein –peptide drug delivery and vaccine delivery systems.
		2	Understand the criteria for selection of drug and polymers for development of delivering system.
		3	Apply knowledge to recent developments such as 3D printing, personalized medicines, telepharmacy and customized drug delivery systems.
		The student will be able to	
		1	To integrate the elements of pre-formulation studies
		2	To infer the process of validation

MPH103T	Modern Pharmaceutics	3	To have a better understanding of industrial management and GMP considerations.
		4	To relate the process of compaction and compression and diffusion parameters
		5	To illustrate the basic of optimization techniques & pilot plant scale up techniques
		6	To be well verse with the active pharmaceutical ingredients and generic drug product development
MPH104T	Regulatory Affair	**The student will be able to**	
		1	Understand the concept of innovator, generic drug and drug development process.
		2	Apply the knowledge of regulatory guidances , guidelines for filing, approval process andpost approval regulatory requirements for actives and drug products.
		3	Explain the process of submission of global documents in CTD /eCTD formats.
		4	Prepare dossiers and understand the process of submission to regulatory agencies in different countries.
		5	Apply the knowledge to get approvals for conducting clinical trials, pharmacovigilence and process in monitoring clinical trials
MPH105P	Pharmaceutics Practical I	**The students will be able to**	
		1	Operate different analytical instruments like UV Visible spectrophotometer, HPLC, flame photometer, Photofluorimeter.
		2	Analyze Pharmacopoeial compounds in bulk and in their formulations (single & multi-component) by UV Visible spectrophotometer, HPLC, GC, flame photometer, Photo-fluorimeter.
		3	Use knowledge to perform dissolution of CR/SR formulations and study effect of particle size and binder on it.
		4	Analyze preformulation studies such as compression force, micromeritics and particle size to design tablet.
		5..	Design sustained release matrix, osmotically controlled, floating, hydro dynamically balanced drug delivery systems and transdermal patches
MPH201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	**The student will be able to**	
		1	Use various approaches for development of novel drug delivery systems such as nanoparticles, liposomes, microspheres, pulmonary drug delivery systems, nucleic acid based therapeutic delivery system.
		2	Select drugs and polymers for the development of NTDS.

		3	Understand recent developments on antisense molecules and aptamers.
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	**The students will be able to**	
		1	To understand basic concepts in biopharmaceutics and pharmacokinetics.
		2	To use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.
		3	To understand critical evaluation of biopharmaceutic studies involving drug product equivalency.
		4	To explain design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
		5	To understand the potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
MPH203T	Computer Aided Drug Development	**The students will be able to**	
		1	Understand the history of computers and apply the different statistical techniques in the pharmaceutical research and development.
		2	Apply the concept of QbD in pharmaceutical research and development.
		3	Predict the effect of transporters on the disposition of drugs which include parameters of drug absorption, distribution, and excretion.
		4	Use design of experiments in the formulation and evaluate all the formulation parameters systematically and in timely manner to optimize the formulation and the manufacturing process.
		5	Understand the ethical issues related to the use of computers in R& D and in market analysis.
		6	Understand the parameters used for model construction and the sensitivity predicted pharmacokinetic responses to various input parameters. Virtual trials for in silico modeling of drug absorption and the influence of food on drug absorption, as well as correlation between the in vitro and in vivo results.
		7	Apply the knowledge of different simulation model in selecting the compound, dose selection, study design, patient-population selection and product labeling.
		8	Use computers as a clinical data management system in clinical research to manage the data generated in a clinical trial.

		9	Apply the knowledge of artificial intelligence in pharmaceutical industry for product development, the knowledge of computational fluid dynamics as a tool for generating solutions for fluid flows and knowledge of robotics in pharmaceutical manufacturing.
MPH204T	Cosmetic & Cosmeceuticals	**The students will be able to understand**	
		1	Key ingredients used in cosmetics and cosmeceuticals.
		2	Key building blocks for various formulations.
		3	Current technologies in the market
		4	Various key ingredients and basic science to develop cosmetics and cosmeceuticals
		5	Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability,
MPH205P	Pharmaceutics Practical II	**The student will be able to**	
		1	Understand the effect of temperature change, non solvent addition, incompatible polymer addition in microcapsules preparation.
		2	Design alginate beads, gelatin /albumin microspheres, liposomes/niosomes, spherules.
		3	Improve dissolution characteristics of slightly soluble drug by solid dispersion technique as well as compare dissolution of two different marketed products /brands.
		4	Understand a highly protein bound drug & poorly protein bound drug.
		5	Understand bioavailability studies of paracetamol in animals, pharmacokinetic and IVIVC data analysis and in vitro cell studies for permeability and metabolism and clinical data collection manual.
		6	Design formulation using Quality-by-design and DoE using Design Expert® Software.
		7	Apply simulations in pharmacokinetics and pharmacodynamics, computational modeling of drug disposition, sensitivity analysis, and population modeling.
		8	Design creams, shampoo, toothpaste base as well as to address dry skin, acne, blemish, wrinkles, bleeding gums and dandruff
M.Pharm.- Pharmaceutical Quality Assurance			
MQA102T	Quality Management System	**The student will be able to**	
		1	Define the basic concepts, terminology of quality, quality control and quality management system.
		2	Understand ISO management systems.
		3	Apply tools for quality improvement

	System	4	Analyze issues in quality
		5	Evaluate quality of pharmaceuticals
		6	Perform stability testing of drug and drug substances.
		7	Demonstrate ability to use statistical approaches for quality.
MQA103T	Quality Control and Quality Assurance	**The student will be able to**	
		1	Apply the GLP and GMP aspects in a pharmaceutical industry.
		2	Implement the cGMP guidelines according to national and international regulations.
		3	Analyze raw materials, finished products, packaging material and perform IPQC.
		4	Maintain, retain and retrieve documents in pharmaceutical industry.
		5	Apply the concepts of manufacturing operations and control.
MQA104T	Product Development and Technology Transfer	**The student will be able to**	
		1	Understand the new product development process
		2	Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D
		3	Elucidate necessary information to transfer technology of existing products between various manufacturing places
MQA105P	Pharmaceutical Quality Assurance Practical I	**The student will be able to**	
		1	Operate different analytical iinstruments like UV Visible spectrophotometer, HPLC, flame photometer, Photofluorimeter, etc.
		2	Analyze Pharmacopoeial compounds in bulk and in their formulations (single & multi-component) by UV Visible spectrophotometer, HPLC, GC, flame photometer, Photo-fluorimeter, etc.
		3	Apply principles of TQM, Six Sigma, change Management/ Change control, Deviations, out of Specifications, Out of Trend, Corrective & Preventive Actions and deviations.
		4	Develop stability study protocol and estimate process capability.
		5	Perform in process and finished product quality control tests for dosage forms (tablets, capsules, parenterals and semisolid) and primary and secondary packaging materials.
		6	Carry out assay of raw materials as per official monographs and testing of related and foreign substances in drugs and raw materials.
		7	Perform pre formulation and accelerated stability studies study for tablets and parenterals.

MQA201T	Hazards and Safety Management	**The student will be able to**	
		1	Understand about environmental problems among learners.
		2	Impart basic knowledge about the environment and its allied problems.
		3	Develop an attitude of concern for the industry environment.
		4	Ensure safety standards in pharmaceutical industry
		5	Provide comprehensive knowledge on the safety management
		6	Empower an ideas to clear mechanism and management in different kinds of hazard management system
		7	Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere.
MQA202T	harmaceutical Validatio	**The student will be able to**	
		1	Apply the concepts of calibration, qualification and validation.
		2	Perform the qualification of various equipments and instruments.
		3	Execute process validation of different dosage forms.
		4	Validate analytical method for estimation of drugs.
		5	Carry out cleaning validation of equipments employed in the manufacture of pharmaceuticals.
		6	Analyze IP and file the patents.
MQA203T	Audits and Regulatory Compliance	**The student will be able to**	
		1	To comprehend the importance of auditing.
		2	To assimilate the methodology of auditing.
		3	To carry out the audit process (vendors, production department, Microbiological laboratory, Quality Assurance and engineering department in Pharmaceutical industry).
		4	To organize the auditing report.
		5	To prepare the check list for auditing.
MQA204T	Pharmaceutical Manufacturing Technology	**The student will be able to**	
		1	To illustrate the common practice in the pharmaceutical industry developments, plant layout and production planning
		2	To infer the principles and practices of aseptic process technology,
		3	To be well verse with basics of non-sterile manufacturing technology

		4	To relate the pharmaceutical packaging technology for different dosage forms.
		5	To Have a better understanding of principles and implementation of Quality by design
MQA205P	Pharmaceutical Quality Assurance Practical II	**The student will be able to**	
		1	Analyze environmental contaminants and residues.
		2	Calibrate, qualify and validate pharmaceutical equipments and analytical instruments.
		3	Validate different pharmaceutical processes and analytical methods.
		4	Prepare check list in auditing process.
		5	Apply principles of QbD and PAT in pharmaceutical manufacturing.
MRM 301T	Research Methodology and Biostatistics	**The student will be able to**	
		1	Understand the approach of doing research and parameters related to research.
		2	Apply knowledge of biostatistics to numerical data during research work.
		3	Perform animal study in accordance with CPCSEA guidelines.

and efficacy.