CO01: Identify characteristics of each route of administration and the requirements of
CO01.01: Define some of the basic terminology used in Pharmaceutics and the rational of dosage form in drug delivery
CO01.02: Recognize the classification of the different dosage forms
CO01.03: List all the basic routes of administrations and dosage forms, and the advantages and the limitations of each one
CO01.04: Define parenteral drug administration and discuss its advantages and disadvantages
CO01.05: Discuss the different parenteral routes and the characteristics and limitations of each route
CO01.06: Discuss the different types of parenteral dosage forms and the characteristics of each one
CO01.07: Discuss the rationale for liquid preparations
CO01.08: Discuss their advantages and disadvantages
CO01.09: List the differences between powders and granules
CO01.10: Describe their advantages and disadvantages
CO01.11: Describe the methods to determine particle size and its effect on dissolution, absorption, and uniformity during processing
CO01.12: Calculate values from different densities, bulkiness and porosity
CO01.13: Define angle of repose and importance for flow calculations
CO01.14: Recognize the main components of a tablet, use and the advantages and disadvantages
CO01.15: Identify the chewable tablet, effervescent tablets and ODT
CO01.16: Rationalize the use of multiple compressed tablets
CO01.17: Identify the components of a capsule and their use
CO01.18: List the differences between hard gelatin capsule, non-gelatin capsules and soft gelatin capsule, and the advantages and disadvantages of each
CO01.19: Describe the relationship between the capsule's number and its size and/or volume
CO01.20: Define what DB capsules are, and why they are different from the rest
CO01.21: Recognize the importance of drug density for capsule size selection and processing
CO01.22: Define suppositories and their differences
CO01.23: Recognize the classifications, types, characteristics, and uses of the different bases
CO01.24: Discuss the proper patient counseling for administration and handling of suppositories
CO01.25: Define topical drug administration versus transdermal administration
CO01.26: Review the emulsion components, types, stability, and vehicle selection criteria
CO01.27: Identify the different routes for topical drug administration
CO01.28: Recognize the different types of topical dosage forms and the characteristics of each one
CO01.29: Identify other (non-cutaneous) topical preparations and their characteristics
CO01.30: Review the relevant anatomy and physiology of the lung
CO01.31: Discuss the rational, advantages and disadvantages of pulmonary drug delivery
CO01.32: Describe the mechanisms of drug deposition in the lung
CO01.33: Review the relevant anatomy and physiology of the ear
CO01.34: Define what is cerumen, its main components, and the treatment of its excessive accumulation
CO01.35: Define the different types of otic dosage forms and their characteristics (i.e. solutions, ointments, suspensions)
CO01.36: Recognize the requirements and the typical components for pharmaceutical otic preparations
CO01.37: Review the relevant anatomy and physiology of the eye and the main components of lacrimal fluids. List the different factors influencing drug absorption from the eye
CO01.38: List the different types of ophthalmic dosage forms and their characteristics
CO01.39: Review the relevant anatomy and physiology of the nasal, sublingual and buccal routes of administration
CO01.40: Recognize the different uses of nasal, sublingual, and buccal routes in drug delivery
CO01.41: Recognize the rational, advantages, and limitations of transdermal drug delivery
CO01.42: Discuss the drug selection criteria for transdermal delivery
CO01.43: Review the relevant anatomy and physiology of the skin membranes
CO01.44: Review the source and the structure of proteins and peptides
CO01.45: Identify the types of proteins and peptides drugs

CO02: Select the most appropriate route of administration and drug delivery system to
CO02.01: Discuss the different routes of administration, specific terminologies, rational, advantages, drug candidate's selection criteria, kinetics, and the USP/FDA requirements for controlled release formulations
CO02.02: Discuss the different designs for oral controlled release formulations
CO02.03: Discuss the advantages and drawbacks of rectal, vaginal, and urethral suppositories
CO02.04: List the different types of dosage forms
CO02.05: Discuss the proper patient counseling for drug administration
CO02.06: Define the different ointment bases and the characteristics of each one for proper base selection for drug delivery
CO02.07: Discuss the FDA requirements for nasal formulation dosage form

CO03: Identify fundamental variables such as physiological barriers and physiochemical
CO03.01: Discuss the factors that influence dissolution and review the Noyes-Whitney equation relationship
CO03.02: Discuss the general rules of solubility and identify the relative terms of solubility
CO03.03: Discuss the physical properties of a tablet and the equipment and methods used to test basic physical properties of the tablets
CO03.04: Recognize the anatomical and physiological factors, the physiochemical properties of the drug base on drug absorption and discuss the ideal formulation properties of suppository's base
CO03.05: Identify the quality control testing for suppositories (physical and chemical analysis)
CO03.06: List the pharmaceutical and physiological factors that may affect drug deposition from the pulmonary route
CO03.07: Discuss the importance of particle size in pulmonary drug delivery
CO03.08: Identify metered dose and dry powder inhalers and their formulations
CO03.09: Discuss the concept of using spacer devices and nebulizers
CO03.10: List the advantages and disadvantages of different devices
CO03.11: Discuss the absorption barriers for each route, how to enhance drug delivery, and the role of penetration enhancers
CO03.12: Discuss the absorption pathways and factors affecting drug absorption. Identify the different designs for the Transdermal Drug Delivery Systems (TDDS)
CO03.13: Discuss the role of penetration enhancers and other methods of enhance transdermal drug delivery
CO03.14: Discuss the proper patient counseling for administration and handling of TDDS
CO03.15: Discuss the different active methods for transdermal drug delivery e.g. Sonophoresis, Iotophoresis, Microneedles, Needle-free injections
CO03.16: Review the physiochemical properties and instabilities of proteins and peptides
CO03.17: Discuss the potential routes for the administration of proteins and peptides drugs
CO03.18: Describe the formulation methods (freeze-drying) and the types of excipients required for the formulation of proteins and peptides drugs
CO03.19: Review sterilization methods
CO03.20: Discuss the strategies to improve the bioavailability of proteins and peptides

CO04: Discuss the fundamentals of compounding techniques for solid, semi-solid and
CO04.01: Describe the official USP types of injections, the USP requirements, and the types of injectable vehicles
CO04.02: List the types of permitted additives and their role in an injectable formulation
CO04.03: Discuss the sterilization methods and industrial preparation of different parenteral products
CO04.04: Describe the different parenterals packaging and testing methods
CO04.05: Describe the facility requirements for the production of parenteral products
CO04.06: Describe the different formulations and the composition of liquid preparations
CO04.07: Compare different manufacturing processes
CO04.08: Discuss the various types of solvents/vehicles for liquid preparations
CO04.09: Discuss the different types of permitted additives
CO04.10: Discuss the different types of the preparation method of collodions
CO04.11: Rationalize the reasons for granulation and learn the main non-medicinal ingredients for granulation.
CO04.12: Identify the various manufacturing equipments, techniques and processes
CO04.13: Recognize the tablet press machinery for tablet manufacturing
CO04.14: Discuss the tablet non-medicinal ingredients an their functional properties
CO04.15: Recognize blending and blend uniformity concepts
CO04.16: Define direct compression comparing the differences, advantages, and disadvantages for wet and dry granulation
CO04.17: Discuss some of the typical problems during tablets manufacturing
CO04.18: Define dissolution testing and the typical methods used
CO04.19: Discuss the components and properties of USP Gelatin capsules and the different types of capsules’ fill and their limitations
CO04.20: Discuss the methods to minimize encapsulation incompatibilities
CO04.21: List the advantages of vegetable capsules and their different types
CO04.22: Define the main components of soft gelatin capsules and their advantages and disadvantages
CO04.23: Define the most common methods for formulating suppositories (fusion, compression, and hand rolling)
CO04.24: Discuss the proper packaging and storage for suppositories
CO04.25: Describe the manufacturing methods and filling procedures for ointments
CO04.26: Recognize the USP requirements for microbial limits, minimum fill, packaging, storage, and labeling
CO04.27: Discuss the components of IUDs and medicated vaginal inserts
CO04.28: Recognize additional physical testing, e.g. viscosity, and in vitro drug release
CO04.29: Recognize the requirements and the typical components for pharmaceutical ophthalmic preparations
CO04.30: List the various methods for targeted delivery of proteins and peptides
CO04.31: Discuss the proper storage and handling of proteins and peptides drugs