



GOJAN SCHOOL OF BUSINESS AND TECHNOLOGY
(An AUTONOMOUS INSTITUTION, AFFILIATED TO ANNA UNIVERSITY)

Regulations: 2025
Skill Development Course List

Semester – III							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
1.	BT25S01	ANATOCORE (Anatomy and Human Physiology)	LIT	1-0-2	3	2	SD
2.	AE25S01	3D Modelling	LIT	1-0-2	3	2	SD
3.	CS25S01	Modern Programming with Python	LIT	1-0-2	3	2	SD
4.	EC25S01	Embedded Technologies	LIT	1-0-2	3	2	SD
5.	PT25S01	AI-Enabled Drug Formulation	LIT	1-0-2	3	2	SD

Dr. C. SELVAKUMAR
PRINCIPAL

GOJAN SCHOOL OF BUSINESS AND TECHNOLOGY
EDAPALAYAM, REDHILLS, CHENNAI-600 052.



BT25S01	ANATOCORE	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES

- To understand medical terminology, root words, prefixes, suffixes, anatomical directions, body planes, and anatomical positions.
- To understand the structure and functions of major human organ systems and identify their associated diseases and disorders.
- To identify common clinical symptoms, clinical signs, and medical specialties related to different organs and body systems.
- To understand vital signs, physiological parameters, normal adult values, and basic diagnostic instruments used for clinical monitoring.
- To develop knowledge of major diseases, their symptoms and clinical signs, and the diagnostic instruments/tests used for their identification.

UNIT 1	MEDICAL TERMINOLOGY AND ANATOMICAL LANGUAGE	6 + 3 (H)
	Medical terminology – medical root words – prefixes – suffixes – terminology related to body systems, colours, skin and musculoskeletal system, tests and procedures – anatomical directions – anatomical terminology – body positions – body planes and sections. Activities: Medical terminology exercises, identification of root words, prefixes and suffixes, anatomical terminology and direction identification, body planes and positions identification, quiz.	
UNIT 2	MAJOR ORGAN SYSTEMS: STRUCTURE, FUNCTION AND DISEASES	6 + 3 (H)
	Brain – major parts and functions – eye – nose – mouth and throat – lungs – heart – digestive system – excretory system – skeletal system – reproductive system – major organs and their functions – common diseases associated with major organ systems. Activities: Identification of major organs and structures, organ-function identification, organ-system activities, disease identification and quiz.	
UNIT 3	CLINICAL SYMPTOMS, SIGNS AND MEDICAL SPECIALTIES	6 + 3 (H)
	Common symptoms related to neurological, cardiovascular, respiratory, haematological, kidney and urinary, gastrointestinal, musculoskeletal, eye, ear and ENT, skin and general systemic conditions – clinical signs – medical specialties – organ and system-based clinical studies. Activities: Symptom and organ-system identification, clinical sign identification, case-based activities, medical specialty identification and quiz.	
UNIT 4	VITAL SIGNS, PHYSIOLOGICAL PARAMETERS AND DIAGNOSTIC BASICS	6 + 3 (H)
	Vital signs – body temperature – pulse and heart rate – respiratory rate – blood pressure – oxygen saturation (SpO ₂) – level of consciousness – pain – blood glucose – ECG – respiratory parameters – EtCO ₂ – height, weight and BMI – urine output – fluid balance – lactate – haemoglobin – heart rate variability – temperature trends – intracranial pressure (ICP) – central venous pressure (CVP) – mean arterial pressure (MAP) – pulse pressure – cardiac output – stroke volume – ejection fraction – peak expiratory flow (PEF) – blood gas parameters. Activities: Demonstration and identification of vital-sign parameters, diagnostic instrument identification, physiological parameter interpretation and ECG/SpO ₂ -based activities.	

UNIT 5	MAJOR DISEASES AND DIAGNOSTIC INSTRUMENTS	6 + 3 (H)
	Neurological diseases – cardiovascular diseases – respiratory diseases – haematological diseases – kidney and urinary diseases – gastrointestinal diseases – musculoskeletal diseases – skin diseases – eye and ENT diseases – endocrine diseases – reproductive diseases – infectious diseases – associated symptoms and signs – diagnostic instruments and tests used for disease identification and assessment. Activities: Disease and symptom identification, disease-to-organ mapping, diagnostic instrument identification, clinical case activities and quiz.	
TOTAL: 45 HOURS		
Weightage: Continuous Assessment: 75%, End Semester Practical Examination: 25%		
Assessment methodology: Internal Examination (MCQ, Fill Ups, match, A/R, label the parts, Application oriented questions) 25%, Software oriented questions 25% and Assignments 25%		

Textbooks

1. Tortora, G. J. & Derrickson, B. H., *Principles of Anatomy and Physiology*, 16th Edition, Wiley, 2021.
2. Marieb, E. N. & Hoehn, K., *Human Anatomy & Physiology*, 11th Edition, Pearson, 2019.
3. Patton, K. T. & Thibodeau, G. A., *Anatomy & Physiology*, 11th Edition, Elsevier, 2020.
4. Cohen, B. J. & Hull, K. L., *Memmler's The Human Body in Health and Disease*, 14th Edition, Wolters Kluwer, 2020.
5. Gylys, B. A. & Wedding, M. E., *Medical Terminology Systems: A Body Systems Approach*, 9th Edition, F.A. Davis, 2021.

References

1. Betts, J. G., Young, K. A., Wise, J. A., Johnson, E., Poe, B., Kruse, D. H., Korol, O., Johnson, J. E., Womble, M. & DeSaix, P., *Anatomy and Physiology 2e*, OpenStax, 2022.
2. Open RN, Ernstmeyer, K. & Christman, E. (Eds.), *Medical Terminology*, 2nd Edition, Chippewa Valley Technical College, 2024.
3. Martini, F. H., Nath, J. L. & Bartholomew, E. F., *Fundamentals of Anatomy & Physiology*, 11th Edition, Pearson, 2018.
4. Moore, K. L., Dalley, A. F. & Agur, A. M. R., *Clinically Oriented Anatomy*, 9th Edition, Wolters Kluwer, 2023.
5. McCance, K. L. & Huether, S. E., *Pathophysiology: The Biologic Basis for Disease in Adults and Children*, 9th Edition, Elsevier, 2023.

E-Sources:

1. OpenStax, Anatomy and Physiology 2e, OpenStax, Rice University. Available: <https://openstax.org/books/anatomy-and-physiology-2e/pages/1-introduction>
2. NCBI Bookshelf, Medical Terminology, 2nd Edition, National Library of Medicine. Available: <https://www.ncbi.nlm.nih.gov/books/NBK607454/>
3. MedlinePlus, Medical Encyclopedia, U.S. National Library of Medicine. Available: <https://medlineplus.gov/encyclopedia.html>
4. MedlinePlus, Understanding Medical Words Tutorial, U.S. National Library of Medicine. Available: <https://medlineplus.gov/medwords/>
5. SEER Training, Anatomy & Physiology, National Cancer Institute. Available: <https://training.seer.cancer.gov/anatomy/>

AE25S01	3D MODELLING	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES:

- To develop practical 3D modelling and product design skills using CAD software (SolidWorks/Creo).
- To introduce AI-assisted design, optimization and engineering documentation workflows.
- To enable students to take a product from sketch to a fully documented parametric assembly.

UNIT I	CAD FUNDAMENTALS, SKETCHING & AI-ASSISTED DESIGN	9
	Role of CAD/CAE in product development – typical CAD workflow – design intent – common sketching errors – introduction to AI in engineering design – AI-assisted idea generation – prompt writing for engineering design – limitations and verification of AI-generated design outputs – drawing commands.	
	Activity: AI-assisted design idea generation using engineering design prompts; sketching skill check and quiz.	
	Practical: Creation of concept sketches from AI prompts and re-drawing of selected concepts in CAD.	
UNIT II	3D PART MODELLING	9
	Parametric modelling – feature tree – parent-child relationships – safe modification – troubleshooting rebuild errors – configurations and variants – reusable design – CAD good-practice checklist – assembly modelling – assembled drawings – AI-assisted design review – interference identification – design modification without recreating the model.	
	Activity: AI-assisted design review and interference-identification exercise; design-modification challenge.	
	Practical: Assembly modelling and modification of an existing parametric model without recreating it.	
UNIT III	PARAMETRIC DESIGN, ASSEMBLY & MECHANISMS	9
	Extrude – extruded cut – revolve – hole wizard/hole feature – fillet – chamfer – shell – advanced features: sweep, loft, rib and draft – linear pattern – circular pattern – mirror – reading component drawings and extracting controlling dimensions – conversion of constrained sketches into basic 3D components – component recreation.	
	Activity: Component drawing interpretation and dimension-identification exercise.	
	Practical: Conversion of constrained sketches into basic 3D components and recreation of a given component.	
UNIT IV	DOCUMENTATION, DRAWINGS & AI-ASSISTED PRODUCT OPTIMIZATION	9
	Generating drawings from 3D models – views – sections – dimensioning – title block – tolerances – design optimization – lightweighting – material selection – mass properties – report creation – comparison of conventional and AI-assisted design alternatives – drawing review.	
	Activity: Comparison of conventional and AI-assisted design alternatives; drawing-review exercise and quiz.	
	Practical: Generation of engineering drawings and preparation of a design/optimization report from a 3D model	
UNIT V	MINI PROJECT & PRODUCT DEVELOPMENT	9
	Product development workflow – requirements – concept development – detailed design – design review – product release – project evaluation criteria – simulation check – 3D-	

	print-ready export – product design challenge – presentation – peer evaluation – viva. Activity: Product design challenge, presentation, peer evaluation and viva. Practical: Development of a mini-project product model with documentation and, where applicable, simulation check or 3D-print-ready export.
Weightage: Continuous Assessment – 50% End semester examinations-50%	
Assessment methodology: Written test (40%) Practical (30%) Activity (30%)	

TOTAL: 45 PERIODS

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL FOR EACH CHAPTER
CO1	Understand the fundamental concepts, tools, techniques and applications of 3D CAD and product design.	K2
CO2	Apply CAD software (SolidWorks/Creo) and AI-assisted techniques to create sketches, parts and assemblies.	K3
CO3	Demonstrate practical skills to develop parametric 3D models, assemblies and engineering drawings for defined problems.	K3
CO4	Apply the models, assemblies and optimization results using CAD, simulation and AI-enabled tools.	K3
CO5	Apply the alternative design approaches and select an appropriate solution for a product design problem.	K3

TEXT BOOKS

1. **D. Planchard**, *Engineering Design with SOLIDWORKS*, SDC Publications.
2. **Sham Tickoo**, *Creo Parametric – A Comprehensive Guide*, CAD/CIM Technologies.
3. **N. D. Bhatt**, *Engineering Drawing*, Charotar Publishing House.

REFERENCE BOOKS

1. **Lombard, M.**, *SolidWorks 2020 Step by Step*, SDC Publications.
2. **Paul Tran**, *SolidWorks 2021 Basic Tools*, SDC Publications.
3. **Randy Shih**, *Parametric Modeling with Creo Parametric*, SDC Publications.

E-RESOURCES

1. **SOLIDWORKS Official Tutorials and Web Help** – tutorials, part modelling, assemblies, drawings and simulation resources. [SOLIDWORKS Web Help & Tutorials](#)
2. **PTC Creo Parametric Tutorials** – beginner, multibody, generative design, simulation and other Creo tutorials with downloadable models. [Creo Parametric Tutorials](#)
3. **SOLIDWORKS MySolidWorks Training** – online lessons, learning paths, videos and certification-oriented training resources. [MySolidWorks Training Resources](#)

COURSE OBJECTIVES:

- To develop sound practical capabilities in Python syntax, core control structures, and complex data paradigms.
- To build comprehensive hands-on skills in writing functional scripts, applying object-oriented constructs, and parsing files with exception guards.
- To integrate 75% practical development benchmarks mapping from syntax mechanics directly into verified runnable solutions.

UNIT	SYLLABUS CONTENT	HOURS
UNIT I	PYTHON BASICS & EXPRESSION MECHANICS Introduction to Python interpreter – core design intents – data variables and basic dynamic typing paradigms – common syntax errors and execution logic – arithmetic, comparison, logic, and bitwise operators – statement blocks – conditional expressions (if, if-else, if-elif-else) – loops (while, for) – loop controllers (break, continue, pass) – terminal console input/output patterns. Activity: Dry run execution of nested loops, structural tracing of edge-case conditional logic, code style validation metrics. Practical: Writing programs for numerical transformations, prime evaluation metrics, custom console calculator scripts with comprehensive branch validation.	7+2 (H)
UNIT II	COLLECTIONS & STRUCTURAL DATA Sequences exploration – Lists: declaration, indexing, slicing, comprehension tools, internal matrix models – Tuples: immutable structures, unpacking variables, structural lookups – Sets: hash-based unique tables, intersection, union, difference mechanics – Dictionaries: key-value storage rules, lookup methods, handling missing keys – nested structures. Activity: Structural code audit for optimization of lookup times across dictionaries vs lists, memory footprint analysis game. Practical: Implementing transactional logs with nested structures, text frequency counters, building clean matrix addition and multiplication blocks.	2+7 (H)

UNIT III	FUNCTIONAL ARCHITECTURE & SCOPE RULES Modular breakdown – function definition rules – parameters: positional, keyword arguments, variable-length (*args, **kwargs), default values – lambda expressions – return pathways – scope resolution: Local, Enclosing, Global, Built-in (LEGB rules) – dynamic state preservation with closure frameworks – recursion limitations – importing custom files. Activity: Trace challenges involving variable scoping side-effects, recursion depth tracing, writing complex custom function signatures. Practical: Building mathematical sequence solvers through functional design, recursive directory parsing stubs, custom string utility sets.	2+7 (H)
UNIT IV	OBJECT-ORIENTED FRAMEWORKS Object paradigms – Class blueprints and Object initialization (__init__) – instance attributes vs class attributes – encapsulating properties via getter/setter techniques – Inheritance hierarchies: single, multiple, multilevel – method overriding structures – super() function call sequences – Polymorphism via duck typing – special methods (__str__, __repr__). Activity: UML class design interpretation exercises, diagramming complex multi-level inheritance frameworks. Practical: Designing an e-commerce shopping cart class structure, banking ledger simulation objects, geometry engine classes with property protection.	2+7 (H)
UNIT V	I/O STREAMS & EXCEPTION RESILIENCE Data persistence – opening streams (read, write, append text/binary modes) – contextual context managers (with statement) – stream position control (seek, tell) – Exception handling theory – try, except blocks – capturing multiple error flags – else and finally assurance layers – throwing custom assertions (raise statement) – custom error classes. Activity: Code review challenges fixing unprotected file pipelines, bug hunting exercises across complex broken try-except architectures. Practical: Developing robust data pipeline scripts reading CSV	2+7 (H)

	files, writing error logger managers, processing system log text blobs safely.	
	TOTAL: 45 HOURS	

Weightage: Continuous Assessment – 50%, End semester examinations – 50%

Assessment methodology: Written test (25%), Practical (50%), Activity (25%)

COURSE OUTCOME

COURSE OUTCOME	DESCRIPTION OF COURSE OUTCOME	MAXIMUM BLOOM'S LEVEL
CO1	Understand foundational elements of Python interpretation syntax, terminal pipelines, variables, and expressions.	K2
CO2	Apply multi-tier composite structural data types like lists, maps, tuples, and sets to handle complex program states dynamically.	K3
CO3	Demonstrate structured modular programming methods using explicit variable scope resolutions, closures, and custom modules.	K3
CO4	Apply structural object-oriented blueprints, complex multi-inheritance models, and polymorphic duck typing workflows.	K3
CO5	Analyze and construct crash-resilient storage pipelines using context managers, stream lookups, and multi-tier exception catch grids.	K4

TEXT BOOKS

1. Eric Matthes, Python Crash Course: A Hands-On, Project-Based Introduction to Programming, 3rd Edition, No Starch Press, 2023.
2. Reema Thareja, Python Programming: Using Problem Solving Approach, Oxford University Press, 2019.

REFERENCE BOOKS

1. Luciano Ramalho, Fluent Python: Clear, Concise, and Effective Programming, 2nd Edition, O'Reilly Media, 2022.
2. Mark Lutz, Learning Python, 5th Edition, O'Reilly Media, 2013.
3. David M. Beazley & Brian K. Jones, Python Cookbook: Recipes for Mastering Python 3, 3rd Edition, O'Reilly Media, 2013.

E-RESOURCES

1. Python Official Documentation – Standard Library syntax, functions, built-in types, and modules guide. Available: <https://docs.python.org/3/>
2. W3Schools Python Tutorial – Interactive fundamental modules, structured practical checks, and quiz environments. Available: <https://www.w3schools.com/python/>
3. Real Python Learning Paths – Advanced functional workflows, object-oriented video lessons, and persistent data track practices. Available: <https://realpython.com/>

EC25S01	EMBEDDED TECHNOLOGIES	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES

- To introduce the fundamental concepts of electrical and electronic circuits, components and measurement techniques.
- To develop programming skills in digital electronics and Embedded C for microcontroller-based applications.
- To provide practical knowledge of microcontrollers, sensors, actuators and hardware interfacing.
- To introduce communication protocols, wireless connectivity and Internet of Things technologies.
- To enable students to design and develop a functional embedded system through a mini project.

UNIT I	BASIC ELECTRONICS FUNDAMENTALS	7
	Electrical fundamentals – voltage, current, resistance and power – Ohm’s law – AC and DC – series and parallel circuits – voltage and current division – electrical safety – electronic components: resistors, capacitors, inductors, diodes, LEDs, transistors, MOSFETs, relays, switches and potentiometers – semiconductor fundamentals – PN junction – diode operation – transistor and MOSFET as switches – breadboard – multimeter – DC power supply – basic circuit testing. Activity: Identification of electronic components, resistor colour-code exercise and basic circuit analysis. Practical: LED and resistor circuit, push-button interface, transistor switching circuit, relay control and basic multimeter measurements.	
UNIT II	DIGITAL ELECTRONICS & EMBEDDED C/C++	7
	Analog and digital signals – number systems – binary, decimal and hexadecimal – logic gates – truth tables – Boolean logic – digital logic levels – pull-up and pull-down resistors – introduction to Embedded C/C++ – variables and data types – operators – conditional statements – loops – functions – arrays – strings – structures – pointers – bitwise operations – header files and libraries – embedded development environment – Arduino IDE – PlatformIO – GPIO programming – digital input/output – ADC – PWM – timers – introduction to interrupts. Activity: Logic gate and number-system exercises Embedded C/C++ programming exercises and debugging challenge. Practical: LED blinking, multiple LED control, traffic light controller, push-button interface, buzzer control, PWM-based LED dimming and digital counter.	
UNIT III	MICROCONTROLLERS & HARDWARE INTERFACING	8
	Microprocessor and microcontroller – microcontroller architecture – Arduino UNO, ESP32 and Raspberry Pi Pico – 8-bit and 32-bit microcontrollers – development environments – GPIO – ADC – PWM – timers – interrupts – sensor fundamentals – analog and digital sensors – temperature and humidity sensors – LDR – IR sensor – ultrasonic sensor – soil moisture sensor – gas sensors – actuators – buzzer – relay – servo motor – DC motor – motor driver – display interfacing – LCD – OLED. Activity: Microcontroller board identification and comparison; Sensor selection and interfacing exercise, actuator control and hardware troubleshooting challenge.	

	Practical: Temperature and humidity monitoring, automatic light control using LDR, ultrasonic distance measurement, servo motor control, DC motor control, relay interfacing and sensor data display.	
UNIT IV	COMMUNICATION INTERFACES & IOT	8
	Serial communication – UART – TX/RX – baud rate – synchronous and asynchronous communication – I²C – SDA and SCL – master and slave – device addressing – SPI – MOSI, MISO, SCLK and CS – comparison of communication protocols – wireless communication – Wi-Fi – Bluetooth – BLE – introduction to Zigbee and LoRa – Internet of Things fundamentals – IoT architecture – sensors, actuators, edge devices, gateways and cloud – MQTT – HTTP – REST API – publish/subscribe model – IoT cloud platforms – ThingSpeak – Blynk – Firebase – cloud data monitoring and visualization. Activity: Communication protocol comparison exercise; IoT architecture design; MQTT publish/subscribe activity; comparison of IoT cloud platforms and dashboard creation exercise. Practical: UART communication, I²C device interfacing, SPI device interfacing, wireless device control, sensor data transmission, cloud-based sensor monitoring using ThingSpeak/Blynk/Firebase, MQTT communication and IoT dashboard development.	
UNIT V	MINI PROJECT & EMBEDDED SYSTEM DEVELOPMENT	15
	Problem identification – requirement analysis – project selection – system architecture – component selection – block diagram – circuit design – flowchart – algorithm development – hardware assembly – embedded programming – sensor and actuator integration – communication interface – IoT integration where applicable – testing and debugging – sensor calibration – system validation – troubleshooting – project documentation – results and analysis – applications – future scope – project presentation – demonstration – peer evaluation – viva. Activity: Project proposal, design review, progress presentation, peer evaluation and final project presentation. Practical: Development of a complete embedded system prototype involving basic electronics, microcontroller programming, sensors/actuators, communication and IoT functionality where applicable.	
TOTAL: 45 PERIODS		
Weightage: Continuous Assessment: 75%, End semester examinations: 25% Assessment methodology: Internal Examination (MCQ) 25% and Practical Assignments (Phase I and Phase II) 50%		

TEXT BOOKS

1. Lyla B. Das, *Embedded Systems: An Integrated Approach*, Pearson India, 2024. [O'Reilly Media](#)
2. Tim Wilmshurst, Rob Toulson and Tom Spink, *Fast and Effective Embedded Systems Design: From Bits and Bytes to IoT, with the Arm Mbed*, 3rd Edition, Elsevier, 2024. [Elsevier Educate](#)
3. James K. Peckol, *Embedded Systems: A Contemporary Design Tool*, 2nd Edition, Wiley, 2024. [Wiley India](#)

REFERENCE BOOKS

1. **Lyla B. Das**, *Embedded Systems: An Integrated Approach*, **Pearson India, 2024**.
This is particularly suitable for an engineering syllabus because it provides broad coverage of embedded-system concepts and is available through Pearson India. [O'Reilly Media](#)
2. **Tim Wilmshurst, Rob Toulson and Tom Spink**, *Fast and Effective Embedded Systems Design: From Bits and Bytes to IoT, with the Arm Mbed*, **3rd Edition, Elsevier, 2024**.
Covers practical embedded development, C/C++, digital I/O, real-time programming, Bluetooth LE, Zigbee and IoT. [Elsevier Educate](#)
3. **James K. Peckol**, *Embedded Systems: A Contemporary Design Tool*, **2nd Edition, Indian Adaptation, Wiley, 2024**.
A substantial reference covering embedded-system design, hardware/software concepts and design projects. [Wiley India](#)
4. **Lawrence J. Henschen and Julia C. Lee**, *Embedded System Design: Methodologies and Issues*, **Elsevier, 2024**.
Covers embedded-system design methodologies, hardware/software selection, communication, networking, cloud/edge computing and IoT. [ScienceDirect](#)

E-RESOURCES

1. Arduino Documentation – Official documentation covering hardware, programming, libraries, tutorials and embedded development. <https://docs.arduino.cc>
2. Arduino Language Reference – Reference for digital I/O, analog I/O, interrupts, Serial, SPI, I²C and other programming functions. Arduino Language Reference Arduino Documentation <https://www.arduino.cc/reference>
3. Arduino Hardware Documentation – Information about Arduino boards, families, shields and development hardware. Arduino Hardware Arduino <https://www.arduino.cc/hardware>
4. Espressif Documentation – Technical documentation, development resources and reference material for ESP32-based embedded and wireless applications. Espressif Documentation Espressif Systems <https://www.espressif.com/en/products/socs/esp32>
5. MQTT Official Documentation – Resources for MQTT concepts, publish/subscribe communication and IoT messaging. <https://mqtt.org/getting-started/>
6. ThingSpeak IoT Platform – Cloud-based IoT data collection, visualization and analysis resources. ThingSpeak IoT ThingSpeak <https://thingspeak.mathworks.com>
7. Blynk Documentation – Resources for IoT device connectivity, dashboards, monitoring and remote control. Blynk Documentation Blynk Documentation <https://www.blynk.io>
8. Firebase Documentation – Resources for Firebase Realtime Database, cloud data synchronization, REST API and application integration. Firebase Realtime Database Firebase <https://firebase.google.com>

PT25S01	AI-ENABLED DRUG FORMULATION	L	T	P	C
		1	0	2	2

COURSE OBJECTIVES

- To understand the fundamental principles of drug formulation, dosage forms, active pharmaceutical ingredients (APIs), and pharmaceutical excipients.
- To understand the selection and functions of suitable formulation components for conventional and advanced dosage forms.
- To understand the basic principles of formulation development, manufacturing approaches, evaluation, and optimization of pharmaceutical dosage forms.
- To understand the application of artificial intelligence (AI) and data-driven approaches in pharmaceutical formulation development.
- To develop knowledge of formulation variables, evaluation parameters, and AI-based approaches for formulation design and optimization.

UNIT 1	FUNDAMENTALS OF DRUG FORMULATION AND DOSAGE	6 + 3 (H)
	Drug formulation – pharmaceutical dosage forms – routes of drug administration – active pharmaceutical ingredients (APIs) – pharmaceutical excipients – selection of excipients – physicochemical properties of drugs – preformulation concepts – solubility – pKa – partition coefficient – drug-excipient compatibility – formulation considerations for different dosage forms. Activities: Identification of dosage forms, identification of APIs and excipients, physicochemical property exercises, solubility and pKa-based exercises, drug–excipient compatibility analysis, quiz.	
UNIT 2	FORMULATION OF CONVENTIONAL DOSAGE FORMS	6 + 3 (H)
	Tablet formulation – tablet excipients – granulation – compression – tablet coating – capsule formulation – powders and granules – oral solutions – syrups – suspensions – emulsions – formulation components – selection of suitable excipients – basic formulation and manufacturing considerations – evaluation parameters of conventional dosage forms. Activities: Identification of major organs and structures, organ-function identification, organ-system activities, disease identification and quiz.	
UNIT 3	SEMISOLID AND ADVANCED DRUG DELIVERY SYSTEMS	6 + 3 (H)
	Ointments – creams – gels – pastes – suppositories – transdermal formulations – controlled-release drug delivery systems – sustained-release formulations – nanoparticles – liposomes – microspheres – polymeric drug delivery systems – formulation considerations for advanced drug delivery systems. Activities: Identification of semisolid dosage forms, comparison of ointments, creams, gels and pastes, advanced drug delivery system identification, formulation component analysis, quiz.	
UNIT 4	AI AND DATA-DRIVEN DRUG FORMULATION	6 + 3 (H)
	Introduction to artificial intelligence in pharmaceutical formulation – AI-assisted formulation design – formulation datasets – identification of formulation variables – API and excipient selection using data-driven approaches – prediction of drug properties – formulation screening – formulation optimization – prediction of dissolution and drug	

	release – machine learning applications in formulation development – AI-based interpretation of formulation data. Activities: Introduction to AI tools, formulation dataset exploration, identification of formulation variables, simple data analysis, AI-based formulation prediction exercises, quiz.	
UNIT 5	FORMULATION DEVELOPMENT, EVALUATION AND OPTIMIZATION	6 + 3 (H)
	Formulation development workflow – formulation variables – quality attributes – formulation evaluation – dissolution studies – drug release studies – stability studies – interpretation of formulation data – optimization of formulation composition – AI-assisted prediction of formulation performance – data-driven formulation optimization – applications of AI in pharmaceutical formulation development. Activities: Formulation development workflow preparation, identification of critical formulation variables, evaluation parameter analysis, dissolution and drug release data interpretation, formulation optimization exercises, quiz.	
TOTAL: 45 HOURS		
Weightage: Continuous Assessment: 75%, End Semester Practical Examination: 25%		
Assessment methodology: Internal Examination (MCQ) 25%, Quiz/Report/Viva 25% and Assignments 25%		

Textbook References

1. **Aulton's Pharmaceutics: The Design and Manufacture of Medicines** – Kevin M. G. Taylor and Michael E. Aulton, **7th Edition, Elsevier, 2026**.
This is the strongest main reference for your syllabus. It covers preformulation, solubility, solutions, suspensions, emulsions, powders, granules, tablets, capsules, modified-release systems, transdermal delivery, nanomedicine, dissolution and stability. [Elsevier Shop](#)
2. **Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems** – Loyd V. Allen Jr. and Timothy B. McPherson, **12th Edition, Wolters Kluwer, 2023**.
Particularly useful for dosage forms, formulation considerations, manufacturing, conventional and novel drug delivery systems. [NCBI](#)
3. **Pharmaceutics** – Alekha Dash, Somnath Singh and others, **2nd Edition, Elsevier, 2023**.
Useful for dosage forms, drug delivery systems, solid/liquid/semisolid dosage forms and emerging therapeutics. [Elsevier Shop](#)

E-Book / Online Reference

1. **Pharmaceutical Formulation – StatPearls** – Shanta Afrin and Vikas Gupta.
This is available **free through NCBI Bookshelf** and provides an accessible reference for pharmaceutical formulation, APIs, excipients, physicochemical properties and formulation considerations. [NCBI](#)

[Free Pharmaceutical Formulation e-book – NCBI Bookshelf](#)

S. V. J.

REKHA S

DIRECTOR - CORPORATE CONNECT
GOJAN SCHOOL OF BUSINESS AND TECHNOLOGY
ED. POLAYAM, REDHILLS, CHENNAI - 600 052.

AERO - *[Signature]*
5/10/26

M&A } *[Signature]*
R&A } 5/10/26

CSE
AIML
CCE
IT
Cyber
AIDS
CSBS } *[Signature]*
05/10/26



ECE
ME
P7
BT } *[Signature]*
5/10/26