REVISED SYLLABUS ACCORDING TO CBCS NEP2020 SECOND-YEAR OF MASTER OF SCIENCE IN PHYSICS

COURSE TITLE:- ELECTRONIC DESIGN
SEMESTER - IV
W.E.F. 2024 - 2025

RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
AND
APPROVED BY THE ACADEMIC COUNCIL

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: **dated 19 April 2024**

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Physics
Name of the Class	:	Second Year
Semester	:	Fourth
No. of Credits	:	04
Title of the Course	:	Electronic Design
Course Code	:	S611PHT
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Second year of M.Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra.
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	PG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024 - 2025

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - IV | **Paper – Physics Paper –III**

Course Title: Electronic Design | **No. of Credits - 04**

Type of Vertical: Major | **COURSE CODE: S611PHT**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…		
Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	Identify various circuit elements
CLO-02	Understand	Understand the use of various circuit elements
CLO-03	Understand	Understand working of Analog-to-Digital Converter (ADCs) and Digital-to-Analog Converter (DACs)
CLO-04	Understand	Appreciate the importance of Electromagnetic Interference (EMI), Electromagnetic Compatibility (EMC), grounding and heat dissipation in electronic design
CLO-05	Understand	Learn the basics of Audio and Video Signals and systems
CLO-06	Apply	Learn and use Printed Circuit Board (PCB) designing and manufacturing techniques

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - IV **Paper – Physics Paper –III**

Course Title: Electronic Design **No. of Credits - 04**

Type of Vertical: Major **COURSE CODE: S611PHT**

COURSE CONTENT			
Module No.	**Content**	**Credits**	**No. of Lectures**
1	**Introduction to Electronic Components** Electronic Components - types, values, testing, classification (Resistor, capacitor, inductor, diode, transistor, transducers/ sensors, actuators, ICs, connectors, heat sinks), Understanding component datasheets and specifications, Introduction to through-hole and Surface Mount Device (SMD) components	**01**	**6**
	Analog Interface to Digital Circuits Basics of analogue signals and digital signals, Analog-to-Digital Conversion (ADC) and Digital-to-Analog, Conversion (DAC), Operational amplifiers and their applications, Analog signal conditioning and filtering techniques		**5**
	Introduction to Noise, EMI, and EMC Understanding noise and its sources in electronic circuits, Signal-to-noise ratio (SNR) and its importance, Electromagnetic Interference (EMI) and ElectroMagnetic Compatibility (EMC) considerations, Techniques for noise reduction and shielding		**4**
2	**Grounding Strategies and Signal Integrity** Importance of grounding in electronic circuits, Grounding techniques: star grounding, ground planes, Signal integrity considerations in high-speed digital circuits, Differential signalling & common mode rejection **Heat Conduction and Dissipation** Basics of heat transfer mechanisms, Thermal management techniques in electronic circuits, Heat sinks, thermal pads, & thermal bias, Understanding junction temperature & thermal resistance	**01**	**15**
3	**Basics of Audio & Video** Introduction to audio & video signals, Components & working principles of speakers & microphones, Amplification & signal processing for audio and video signals, Basics of audio /video interfaces **Ref – KJ, JW** **Schematics, Simulation, Layout** Introduction to schematic tools, Circuit simulation using SPICE (Simulation Program with Integrated Circuit Emphasis), PCB layout design principles and guidelines Design considerations for EMC/EMI compliance during layout **Ref – SPICE simulator reference manual**	**01**	**15**

4	**Construction & Manufacturing of Printed Circuit Boards (PCB)** Printed Circuit Boards (PCBs), their types, manufacturing process workflow schematic, layout, etching, drilling, solder masking, PCB materials and stack-up considerations, Design for manufacturability (DFM) and Design for Assembly (DFA) principles **Introduction to PCB assembly techniques:** Surface Mount Technology (SMT), Through-Hole Technology (THT) Soldering, Testing, and Troubleshooting **Basics of soldering techniques:** through-hole and surface mount soldering **Ref - DOCS**	**01**	**15**
	Total	**04**	**60**

References:-

KJ: Video Demystified by Keith Jack

JW: Introduction to Digital Audio by John Watkinson, Second Edition-Focal Press (2002)

DOCS: https://www.altium.com/documentation/altium-circuitmaker

Access to the Course

The course is available for all the students admitted for Master of Science in Physics.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.