

Resolution No. AC//I/(23-24).2.RUS10

S. P. Mandali's
Ramnarain Ruia Autonomous College
(Affiliated to University of Mumbai)



Syllabus for
Program: F.Y.B.Sc. (SEC)
Program Code: (RUSPHY)
2024-25

(As per the guidelines of National Education Policy 2020-
Academic year 2023-24)

(Choice based Credit System)

Graduate Attributes

S. P. Mandali's Ramnarain Ruia Autonomous College has adopted the Outcome Based Education model to make its science graduates globally competent and capable of advancing in their careers. The Bachelors Program in Science also encourages students to reflect on the broader purpose of their education.

Graduate Attributes	Graduate Attributes Description
	A student completing Bachelor's Degree in Science program will be able to:
Graduate Attributes- 1	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
Graduate Attributes- 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences
Graduate Attributes- 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
Graduate Attributes- 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyze results.
Graduate Attributes- 5	Take complex challenges, work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
Graduate Attributes- 7	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
Graduate Attributes- 8	Follow ethical practices at work place and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
Graduate Attributes- 9	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner

PROGRAM OUTCOMES

PO	Description
	A student completing Bachelor's Degree in Science program in the subject of Physics will be able to:
PO 1	To demonstrate fundamental and procedural knowledge related to different areas of study in Physics including mechanics, optics, modern physics, thermodynamics, electronics, electrodynamics at a level attuned with graduate programs in physics at peer institutions
PO 2	To demonstrate comprehensive, quantitative and conceptual understanding of the core areas of physics.
PO 3	To apply the principles and acquired skill-set related to physics, to handle innovative and unfamiliar problems, so that effective solution or strategy to deal with, could be developed.
PO 4	To explore and deduce quantitative results in the extents of physics.
PO 5	To use contemporary experimental apparatus and analysis tools to acquire, analyse and interpret scientific data in the extents of physics.
PO 6	To communicate scientific results effectively in presentations or posters in the extents of physics to both the scientists and public at large.
PO 7	Utilize acquired ICT skills, physics practical skills, mathematical skills to prepare for employment, for advancement of a career path and also for lifelong learning in Physics.

CREDIT STRUCTURE BSc

Semester	Subject 1		Subject 2	GE/ OE course (Across disciplines)	Vocational and Skill Enhancement Course (VSC) & SEC	Ability Enhancement Course/ VEC/IKS	OJT/FP/CEP CC, RP	Total Credits
	DSC	DSE						
1	4		4	4 (2*2)	VSC-2 + SEC -2	AEC- 2 (CSK) + VEC- 2 (Env Sc.) + IKS-2		22
2	4		4	4 (2*2)	VSC-2 + SEC-2	AEC-2 (CSK)+ VEC-2 (Understanding India)	CC-2	22
Total	8		8	8	8	10	2	44
Exit option: award of UG certificate in Major with 44 credits and an additional 4 credit Core NSQF course/ Internship or Continue with Major and Minor								
3	Major 8		Minor 4	2	VSC-2	AEC-2 MIL	FP -2, CC-2	22
4	Major 8		Minor 4	2	SEC-2	AEC-2 MIL	CEP-2, CC-2	22
Total	16		8	4	4	4	8	44
Exit option: award of UG Diploma in Major with 88 credits and an additional 4 credit Core NSQF course/ Internship or Continue with Major and Minor								
5	DSC 12	DSE 4	Minor 2		VSC-2		CEP/FP-2	22

6	DSC 12	DSE 4	Minor 2				OJT-4	22
Total	24	8	4		2		6	44
	Exit option: award of UG Degree in Major with 132 credits or Continue with Major for Honours/ Research							

Course Code- Skill Enhancement Course: RUSSECPHY.O101

Course Title: Optics

Academic year 2024-25

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION
	A student completing this course will be able to:
CO 1	Understand basic knowledge about optics.
CO 2	Evaluate the phenomenon in optics at different processes. and further interest of scientific community in the research on optics.
CO 3	Explore possibility of practical application of optics in the fields of Agriculture, medicine, food.
CO 4	Apply the laws of optics to formulate the relations necessary to analyse optical processes
CO 5	Distinguishing the concepts of optics
CO 6	Distinguishing the concepts of Interference, aberrations, and Diffraction and its practical application to Eyepieces in optical instruments.

DETAILED SYLLABUS

Course Code	Unit	Course/ Unit Title	Credits/ Hours
RUSSECPHY.O101		Optics	1 credit
	I	Optics	15 Hours
		Equivalent focal length of two thin lenses, thick lens, cardinal points of thick lens, Ramsden & Huygens Eyepiece. Aberration: Spherical Aberration-Derivation - reduction in spherical aberration BSA: 6.1, 6.2, 6.2.1 to 6.2.3, 10.10, 10.11 BSA:9.2,9.3,9.4,9.5 9.5.1,9.6,9.10,9.11,9.12,9.13(1) (2) Interference: Interference in thin films, Fringes in Wedge shaped films-Application-antireflection coating Diffraction: Fresnel's diffraction: Introduction, Huygens's -Fresnel's theory, Fresnel's assumptions, Distinction between interference and diffraction, Fresnel and Fraunhofer types of diffraction, Half period zones, Diffraction due to single edge-Intensity profile on screen, Diffraction due to narrow wire. BSA: 15.1, 15.2.1 to 15.2.5, 15.3, 15.5, 15.6.1, 15.6.2 BSA: 17.1, 17.2, 17.3, 17.6, 17.7, 17.10, 17.10.1, 17.10.2, 17.11, 17.12, 18.1, 18.2, 18.2.1, 18.4, 18.4.2, 18.7, 18.7.1, 18.7.2, 18.7.8(i to vi)	

References:

1. A textbook of Optics by Brijlal, Subramanyam & Avadhanulu (**BSA**)
2. Optics -Jenkins and white (**JW**)

Additional References:

1. Optics by C. L Arora
2. Ref. Jenkins and white-Optics
3. Principles of Optics – B. K. Mathur and T. P. Pandya (3rd Ed.)

Practical

Course Code: RUSSECPHYP.O101

Sr. No.	Regular Experiments
1.	Combination of lenses
2.	Spectrometer (Angle of Prism)
3.	Spectrometer (Minimum Angle of deviation & μ)
4.	Newton's ring / Wedge shaped film
5.	Single slit Diffraction
6.	Narrow wire diffraction-Interference fringes
	Skill Experiments
1.	Absolute and Relative Error Calculation
2.	Use of Travelling Microscope
3.	Spectrometer (Schuster's Method)

➤ **Any one out of the following activity is equivalent to two experiments.**

1. Student doing **mini-project** up to the satisfaction of the Professor or In-Charge of the Practical.

2. Study Tour: Students participated in study tour must submit a **study tour report**

➤ **Regular 5 experiments out of 6 and 2 skill experiments out of 3** from the list should be completed in the first semester and reported in the Journal to appear for the practical examination.

➤ **Certified Journal is a MUST** for a candidate to be eligible for the **end semester practical examination**.

For **External practical examination**, student will be **examined in 1 regular experiment**.

Modality of Assessment: Skill Enhancement Course (1 Credit Theory Course for BSc)

A) Internal Assessment- 40%- 10 Marks

Sr No	Evaluation type	Marks
1	Class Test	10
	TOTAL	10

B) External Examination (Semester End)- 60%- 15 Marks**Semester End Theory Examination:**

1. Duration – The duration for these examinations shall be of **45 Minutes**.
2. Theory question paper pattern:

Paper Pattern:

Question	Options	Marks	Questions Based on
1	Class Test	15	
	TOTAL	15	

Modality of Assessment: Skill Enhancement Course (1 Credit Practical course)**Practical Examination Pattern: Total Marks 50****A. Internal Examination: 40%- 20 Marks**

Question	Options	Marks
1	Journal	10
2	Class test	10
	Total (= 1 + 2)	20

B. External Examination: 60%- 30 Marks**Semester End Practical Examination:****C) External Examination (Semester End)- 30 Marks****Semester End Practical Examination:**

1. Duration – The duration for these examinations shall be of **90 minutes**.
2. Practical question paper pattern:

Paper Pattern:

Question	Options	Marks
1	Laboratory work	25
2	Viva	5
	Total (= 1 + 2)	30