

Programme Specifications



Programme: Optoelectronics
Department: Physics

Faculty of Science and Humanities
M. S. Ramaiah University of Applied Sciences

University House, New BEL Road, MSR Nagar, Bangalore – 560 054

www.msruas.ac.in

Programme Specifications: M.Sc.(Optoelectronics)

Faculty	Faculty of Science and Humanities (FSH)
Department	Physics
Programme	M.Sc.(Optoelectronics)
Dean of Faculty	Prof. M. R. Srinivasan
HOD	Prof. M. R. Srinivasan

1. Title of the Award

M.Sc.(Optoelectronics)

2. Modes of StudyFull-Time **3. Awarding Institution /Body**

M S Ramaiah University of Applied Sciences-Bangalore, India

4. Joint Award

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5. Teaching Institution

Faculty of Science and Humanities (FSH)

M S Ramaiah University of Applied Sciences-Bangalore, India

6. Date of Programme Specifications

August 2014

7. Date of Programme Approval by the Academic Council of MSRUAS

August 2014

8. Next Review Date

June 2016

9. Programme Approving Regulatory Body and Date of Approval

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10. Programme Accrediting Body and Date of Accreditation

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11. Grade Awarded by the Accreditation Body

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12. Programme Accreditation Validity

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13. Programme Benchmark

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14. Rationale for the Programme

Optoelectronics has been a buoyant area for careers for the last 30 years, and there are signs of this increasing, rather than diminishing. It is at the heart of our world's most exciting technologies. It is a technology of the future. Optoelectronics, fiber optic communication and optical networks have revolutionized global communication. Apart from global communication, optical technologies are widely used for system development in the areas distributed sensing, biomedical applications, industrial manufacturing, display and lighting, defence environments, etc. India has a gigantic consumer market for these optical components and systems. The government is also encouraging photovoltaic as an alternative for generating energy. Biomedical optics including microscopy, endoscopy and skin treatment is another major application area of optoelectronics. The study of physics and technology of optoelectronics devices, fiber optic communication and optical networks for efficient transmission of information across the globe has become very important and presents exciting job opportunities. This interdisciplinary field is ideal for creative and versatile physicists to play their crucial role in technology development.

In our country, teaching/research in optoelectronics is being carried out in a number of universities and CSIR/Defence laboratories. There are also plenty of opportunities for pursuing doctoral programs in US/Europe. In a majority of Indian universities, topics in optoelectronics are taught as a part of the course in solid state physics. Consequently, postgraduate students opting for solid state physics do not get in-depth knowledge of optoelectronics. Also these courses lack application oriented approach, which is essential to make the degree programme more fulfilling and professional from student career perspective.

After nearly two decades of IT revolution and its booming economic impact on the country, there is a positive trend and appreciation for the role and importance of basic sciences for further technological advancement. There is a need for qualified and competent post graduate students with sound knowledge in Physics in general and Optoelectronics

The Faculty of Science and Humanities of MSRUAS offers the M.Sc.(Optoelectronics) programme with an outcome based curriculum emphasizing the Critical, Analytical and Problem Solving skills to equip the students to pursue their scientific and research career with better preparedness and matured professional outlook. The presence of other allied Faculties of the University provides additional exposure to students the multi-disciplinary approach which is emerging as a key differentiator in the success of modern scientific and engineering endeavors.

In the coming years, the government intends to boost up funds for basic sciences. There is an acute shortage of qualified teaching staff. The job prospects for candidates with M.Sc. (Optoelectronics) looks good.

15. Programme Aim

The aim of the programme is to train postgraduates with advanced knowledge and understanding of optoelectronics with higher order critical, analytical, problem solving and research skills; ability to think rigorously and independently, to meet higher level expectations of academia and research with sufficient transferrable skills.

16. Programme Objectives

The programme objectives of M. Sc. (Optoelectronics) are to:

- Impart higher level knowledge and understanding of optoelectronics
- Apply the principles of optoelectronics for newer applications
- Enable students to analyse mathematical models of physical systems for enhancement of system performance and arrive at limitations of physical systems
- Enhance students' ability to develop mathematical models of defined physical systems
- Prepare students to evaluate the soundness of concepts proposed
- Hone students' skills to pursue physics as a teaching and research career
- Train students in team work and in lifelong learning for continuous professional development

17. Intended Learning Outcomes of the Programme

The intended learning outcomes are listed under four headings:

1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability/ Transferable Skills.

17.1 Knowledge and Understanding

After undergoing this programme, a student will be able to:

- KU1: Describe the functioning of lasers and optoelectronic devices
- KU2: Explain working of a fiber optic communication system
- KU3: Acquire a knowledge of optical networks
- KU4: Select appropriate tools of nano-optics for desired applications

17.2 Cognitive Skills

After undergoing this programme, a student will be able to:

- CS1: Explore new materials for optoelectronic applications
- CS2: Design and simulate fiber optic communication systems
- CS3: Design and characterize optical networks
- CS4: Apply the techniques for optical engineering to fabricate novel devices

17.3 Practical Skills

After undergoing this programme, a student will be able to:

- PS1: Perform measurements related to lasers and fiber optic communication system
- PS2: Conduct experiments with a variety of scientific equipment with minimum guidance
- PS3: Design PC based instrumentation
- PS4: Use MATLAB /MOEMS Software

17.4 Capability /Transferable Skills

After undergoing the programme, a student will be able to

- TS1: Manage information, develop technical reports and make presentations
- TS2: Build, Manage and Lead a team to successfully complete a project and communicate across teams and organizations to achieve professional objectives
- TS3: Work under various constraints to meet project targets
- TS4: Adopt to the chosen profession by continuously upgrading his/her knowledge and understanding through Life-long Learning philosophy

18. Structure

The following are the modules a student is required to successfully complete for the award of the degree. The programme is delivered as per the Time-Table for every batch.

h : M.Sc.(Optoelectronics)			
Module Code	Modules	Credits	Duration Weeks
Department- Common Modules			
PHY501	1. Classical Mechanics	5	5
PHY502	2. Quantum Mechanics	5	5
PHY503	3. Statistical Physics	5	5
PHY504	4. Electrodynamics	5	5
PHY505	5. Instrumentation & Measurement Techniques	5	5
h - Specialisation Modules			
OPE501	1. Applied Optics	5	5
OPE502	2. Physics of Optoelectronic devices	5	5
OPE503	3. Fiber Optic Communication & Optical Networks	5	5
OPE504	4. Nonlinear Optics	5	5
OPE505	5. Nano-Optics and MOEMS	5	5
Faculty-Common Modules			
FSH501	1. Research Methodology	4	4
FSH502	2. History of Science and Technology	3	3
FSH503	3. Soft Skills	3	3
Elective Modules			
FSH504	1. Teaching	5	5
FSH505	2. Seminar/Internship	5	5
OPE600	Dissertation	25	25
Mandatory Module			
FSH506	Conference/Journal Publication	5	5
		100	100

Note:

1. The Vacations and other activities shall be as per the Time-Table for the corresponding batch.

19. Module Delivery Structure- Full-Time

A module is delivered from Monday to Friday of the week. The lecture classes will be normally held from 9.30 AM to 1.00 PM with 30 minutes of break. The laboratory classes will be held in the afternoon from 2.00PM to 5.00 PM during the first two weeks of the module.

Module 1 to Module 10				
Week-1	Week-2	Week-3	Week-4	Week-5
Module Delivery	Module Delivery	Study Work	Examination	Assignment submission & Presentation

20. Teaching and Learning Methods

The module delivery comprises of combination of few or all of the following:

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory/Field work
6. Industry Visit
7. Seminars/Conferences
8. Group Exercises
9. Project Exhibitions
10. Management Festivals

21. Elective Module

FSH 504 Teaching

A student can teach a module in his / her area of specialisation in any institute approved by the department. The student must submit the teaching notes and also

make a presentation to a team of examiners.

FSH505 Seminar/Internship

Seminar

A student can deliver a seminar of one hour duration of his/her original study on a contemporary topic. Topic of the seminar should be registered at the beginning of the elective module. At the end, seminar must be delivered to a team of examiners and also a word processed report must be submitted for assessment.

Internship

Internship is to be done with a research organization for a period of 5 weeks. The student is required to submit a report for assessment and also make a presentation to a team of examiners. The internship should be related to the programme. A student is required to find internship on his/her own but the student placement office may assist in getting internship.

FSH506 Journal/Conference Publication

Conference Publication

A student can submit a paper and make a presentation in a conference which is approved by the department. The same paper shall be presented for assessment and the student is required to make a presentation to a team of examiners.

Journal Publication

A student can publish a paper in an Indian or International journal. The proof of submission to the journal publication and a copy of the paper shall be submitted followed by a presentation for assessment.

24. Assessment and Grading

A module assessment will have two components:

Component - 1

Assignment 50% weight

Component - 2

Examination 50% weight

(Note: For more details on the break-ups, please refer to the Module Specifications)

A student is required to score a minimum of 40% in each of the components and an overall 40% for successful completion of a module and earning the credits.

Note: Final marks awarded in each of the modules will be confirmed only after SAB/PAB as explained in Academic Regulations of M.Sc. Programme.

25. Failure and Re-registration

If a student fails in a module, he/she is required to re-attend the module when offered next time by re-registering to the module.

26. Attendance

A student is required to have a minimum of 85% attendance to be eligible to write the examination and assignment submission. Less than 85% attendance is considered to be FAIL; such a student is required to follow the same procedure as that of a failed student.

Any condoning of shortfall of the attendance is as per the Academic Regulations for M.Sc. Programme.

27. Award of Class

As per the Academic Regulations for M.Sc. Programme.

28. Student Support for Learning

Students are given the following support:

1. Module Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility
5. Computing Facility
6. Laboratory Facility
7. Workshop Facility
8. Staff Support
9. Lounges for Discussions
10. Any other support that enhances their learning

29. Quality Control Measures

The following are the Quality Control Measures:

1. Review of Module Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback
4. Moderation of Assessed work
5. Opportunities for the students to see their assessed work
6. Review by External Examiners and External Examiners Reports
7. Staff Student Consultative Committee Meetings
8. Student Exit Feedback
9. Subject Assessment Board
10. Programme Assessment Board

30. Curriculum Map

Module Code	Intended Learning Outcomes											
	Knowledge and Understanding				Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving, Innovation)				Practical skills			
	KU1	KU2	KU3	KU4	CS1	CS2	CS3	CS4	PS1	PS2	PS3	PS4
PHY501											X	X
PHY502	X	X		X	X						X	X
PHY503	X	X					X				X	X
PHY504		X							X	X	X	X
PHY505		X			X				X			
OPE501	X	X		X	X				X			
OPE502		X	X			X				X		X
OPE503			X	X	X	X	X	X			X	
OPE504	X	X	X		X	X	X	X	X	X	X	X
OPE505				X	X	X	X	X	X		X	X
Error! Reference source not found.											X	X
Error! Reference source not found.	X	X	X	X	X	X	X	X	X	X	X	X
Error! Reference source not found.	X	X	X	X	X	X	X	X	X	X	X	X
Error! Reference source not found.	X	X	X	X	X	X	X	X	X			
FSH505												
FSH506												
OPE600	X	X	X	X	X	X	X	X	X	X	X	X

31. Capability/ Transferable Skills Map

Module Code	Group work	Self learning	Research Skills	Written Communication Skills	Verbal Communication Skills	Presentation Skills	Behavioral Skills	Information Management	Personal management/ Leadership
PHY501		X	X	X	X	X		X	
PHY502		X	X	X	X	X		X	
PHY503		X	X	X		X		X	
PHY504	X	X	X	X	X	X	X	X	
PHY505		X		X			X		
OPE501		X	X	X	X	X		X	
OPE502		X	X	X	X	X		X	
OPE503		X	X	X	X	X		X	
OPE504		X	X	X	X	X		X	
OPE505		X	X	X	X	X		X	
Error! Reference source not found.		X		X	X	X		X	
Error! Reference source not found.		X	X	X	X	X		X	
Error! Reference source not found.		X	X	X	X	X	X	X	X
Error! Reference source not found.	X	X	X	X	X	X	X	X	X
FSH505	X	X	X		X	X			
FSH506		X	X	X	X	X		X	
OPE600	X	X	X	X	X	X	X	X	X

32. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities for them to enhance their knowledge and network.

33. Cultural and Literary Activities

To remind and ignite the creative endeavors annual cultural festivals are held and the students are made to plan and organise the activities.

34. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on daily basis.

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