Name of Institute: Indus Institute of Sciences, Humanities and Liberal Studies

Name of Department: Physics

Name of Faculty: Ronak Patel

Course code: MPH0303

Course name: Microprocessor and Remote Sensing

Pre-requisites: 12th Std Physics & B.Sc. Physics (Basic knowledge of digital circuits and electronics,Electromagnetic theory)

Credit points: 04

Offered Semester: III

Course Coordinator (weeks 01 - 17)

Full name: Prof. Ronak Patel

Department with sitting location: Staff room, 4th Floor, Bhanwar building

Telephone: 3327 (sitting location), 9429748939 (Mobile)

Email:ronakpatel.ec@indusuni.ac.in

Consultation times: 1:30 pm to 4:45 pm (Monday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Lecturer (weeks 01 – 17, two lecture/week)

1)

Full name: Prof. Ronak Patel

Department with sitting location: Staff room, 4th Floor, Bhanwar building

Telephone: 3327 (sitting location), 9429748939 (Mobile)

Email:ronakpatel.ec@indusuni.ac.in

Consultation times: 1:30 pm to 4:45 pm (Monday)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

2)

Full name: Dr.manisha Vithalpura

Department with sitting location: Physics Lab,3rd floor

Telephone: 7874636405 (mobile)

Email:ronakpatel.ec@indusuni.ac.in

Consultation times:

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1) To gain skill in problem solving and critical thinking.
2) To analyse a problem, identify and formulate using the concept of physics
3) To enhance the logic ability an programming skill
4) To understand basics of microprocessor, microprocessor architecture and programming.
5) To provide background knowledge and understanding of principles of RS and RS systems
6) To enable critical, spatial and temporal thinking on RS for real world applications

Course Outcomes (CO)

1) Understand the architecture of 8085 8-bit microprocessor
2) Describe the importance and function of each pin 8085 microprocessor.
3) Write, debug and simulate assembly language program
4) To compare different EO systems taking into account the essence of the observed phenomena
5) To carry out effective and accurate geometric and atmospheric corrections to reduce observation distortion
6) To carry out independent scientific remote sensing research or professional RS assignments

Course Outline

Unit:1 **[12 hours]**

Introduction of Microprocessor, 8085 Microprocessor architecture, buses, register, flags. 8085 pin configuration &function of each pin. Fetch, Decode and execute operations. Op-code Fetch, execute cycle,T state, Machine cycle. Memory and I/O read and write cycles WAIT state, interrupt timing diagram

Unit:2 **[12 hours]**

Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction And Data Formats, Writing, Assembling & Executing A Program, Debugging The Program Writing 8085 assembly language programs with decision, making and looping using data transfer, arithmetic, logical and branch instructions

Unit-3 **[12 hours]**

Electromagnetic radiation, frequency and wavelength; nature of electromagnetic radiation, polarization, atmospheric windows and absorption bands; interaction with surface features, spectral reflectance, identification of surface elements based on spectral reflectance, spectral reflectance of vegetation.

Unit-4 **[12 hours]**

Types of sensors: multi-spectral, hyper-spectral, thermal IR and synthetic aperture radars; sensor design and selection; Image processing, digital image processing, radiometric and geometric corrections, atmospheric corrections, pixel resampling methods

Method of delivery

(Face to face lectures,online session, video lectures, Power Point Presentation, Self assessment, Active Learning Techniques)

Study time

(4 hours per week for lectures)

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness** **To understand the important phenomena of Microprocessor and remote sensing along with application of it**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing** Critical and logical thinking is developed through numerical practice and analytical calculations Used various sources of the material and technology to perform the experimental part.
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills** **Various programming based practicing experimental work is involved which develops logical and critical thinking.**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication**
	6 Oral communication **Arranging presentation on different physics topics throughout the semester**
	7 Teamwork

	Group discussion in class and lab is arranged
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Lecture slot:

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for end semester examinations.

Details of referencing system to be used in written work

Students has to refer reference book suggested by the faculty. Also they can access online courses video lecture i.e. NPTEL etc. for the reference study.

Text books

1. George Joseph. Fundamentals of Remote Sensing, Orient Blackswan
2. Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Oxford

Additional Materials

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar, Penram International Publishing India Private LTD. (Fifth edition)

2. Fundamentals of Microprocessors & Microcomputers, B. Ram ,Dhanpat Rai & Sons.

3. Microprocessor 8085 and its Interfacing, By Sunil Mathur, Second Edition, PHI Learning Pvt. Ltd.

4. S. Kumar. Basics of Remote Sensing and GIS, Laxmi Publications

5. Ghassem Asrar. Theory and Applications of Optical Remote Sensing, WileyInterscience

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Continuous Internal Evaluation (Theory)			
Mid Sem Exam		40% , Unit-1/3, Objective (1,2,45)	
Assignments		**10% , Objective (1 to 6)**	
Project/Presentation		5% , Objective (1 to 6)	
Attendance	5%		
Total		**60% (CIE theory)**	
Final exam (*closed book*)		40%	Objectives (1-6)

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 50% in CIE or end semester will be considered for supplementary assessment in the respective components (i.e CIE or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (CIE or end semester) and need to obtain the required minimum 50% marks to clear the concerned components.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.

Do not share your work with other students (except where required for a group activity or assessment.

Course schedule (subject to change)

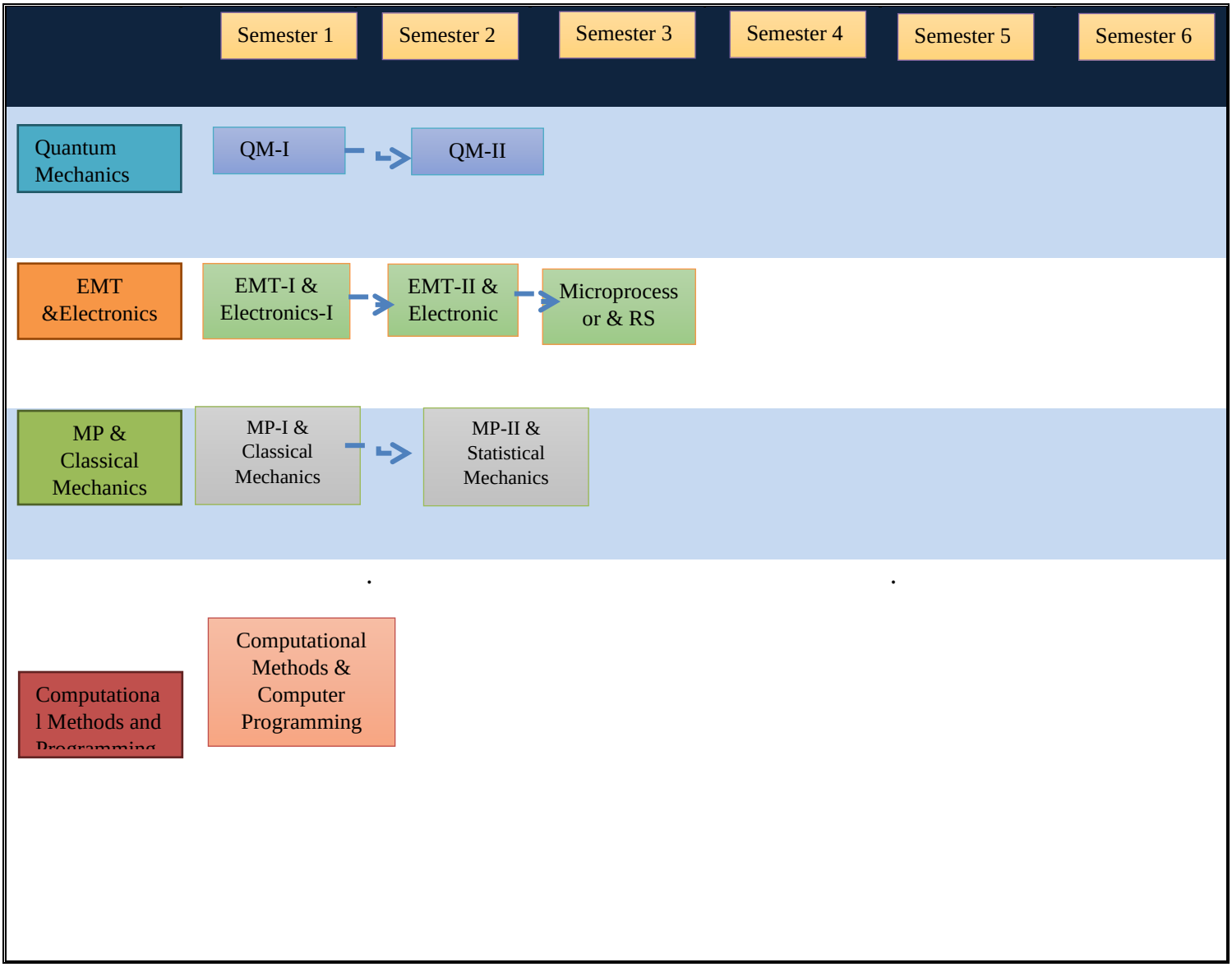
	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	**U-1**: Introduction of syllabus and microprocessor U-3 : Introduction to Remote sensing, Electromagnetic radiation, frequency and wavelength;	1 to 6	PPT and video lecture
	Weeks 2	U-1: 80850 microprocessor architecture U-3: nature of electromagnetic radiation, polarization, atmospheric windows and absorption bands	1 to 6	PPT and video lecture
	Week 3	U-1:8085 pin configuration and its functions U-3: interaction with surface features, spectral reflectance,	1 to 6	PPT and video lecture
	Week 4	U-1: Op-code Fetch, execute cycle,T state, Machine cycle U-3: identification of surface elements based on spectral reflectance	1 to 6	PPT and video lecture
	Week 5	U-1:Memory and I/O read and write cycles WAIT state, U-3: spectral reflectance of vegetation	1 to 6	PPT and video lecture
	Week 6	U-1: interrupt timing diagram U-3: illustrative examples	1 to 6	PPT and video lecture,
	Week 7	U-1: Illustrative Examples and Unit Test-I U- 3: presentation, assignment	1 to 6	PPT and video lecture, test, presentation, assignment
	Week 8	U-2: Assembly Language Programming Basics U-4: Introduction to sensors	1 to 6	PPT and video lecture

	Week 9	U-2: Classification of Instructions U-4 : Types of sensors: multi-spectral, hyper-spectral	1 to 6	PPT and video lecture
	Week 10	U-2: Addressing Modes U-4: thermal IR and synthetic aperture radars	1 to 6	PPT and video lecture
	Week 11	U-2: 8085 Instruction Set, Instruction And Data Formats U-4: sensor design and selection;	1 to 6	PPT and video lecture
	Week 12	U-2: Writing, Assembling & Executing A Program U-4: Image processing, digital image processing	1 to 6	PPT and video lecture
	Week 13	U-2: Seminar presentation U-4: radiometric and geometric corrections, atmospheric corrections	1 to 6	PPT and video lecture
	Week 14	U-2: Debugging The Program Writing 8085 assembly language programs with decision U-4: presentation & assignment	1 to 6	PPT and video lecture, presentation & assignment
	Week 15	U-2: making and looping using data transfer, arithmetic, logical and branch instructions U- 4: , pixel resampling methods	1 to 6	PPT and video lecture
	Week 16	U-2: Unit Test and Illustrative problems U-4: Illustrative examples	1 to 6	PPT and video lecture
	Week 17	U-2: Discussion on project/assignment/presentation and assignment submission U- 4: Revision & Discussion	1 to 6	PPT and video lecture

PROGRAM MAP for M.Sc. Physics

(Indus Institute of Sciences, Humanities and Liberal Studies)

Subject Mind Mapping



To be used for the M.Sc. Physics students