

# **M.Sc. Environmental Sciences**

## **Scheme and Syllabus**

**Outcome Based Education System (OBES)/  
Learning Outcomes based Curriculum Framework (LOCF)/  
Choice Based Credit System (CBCS)**

**ACADEMIC SESSION**

**(w.e.f. 2021-2022)**



**DEPARTMENT OF ENVIRONMENTAL SCIENCE AND  
ENGINEERING**

**J. C. BOSE UNIVERSITY OF SCIENCE AND  
TECHNOLOGY, YMCA, FARIDABAD HARYANA -121006**

*Anil*

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*Sanku*

*Repti*



## **J C BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA, FARIDABAD**

### **VISION**

J C BOSE University of Science and Technology, YMCA aspires to be a nationally and internationally acclaimed leader in technical and higher education in all spheres which transforms the life of students through integration of teaching, research and character building.

### **MISSION**

- To contribute to the development of science and technology by synthesizing teaching, research and creative activities.
- To provide an enviable research environment and state-of-the art technological exposure to its scholars.
- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their social responsibilities

Anil

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Sanku

Rajiv



## DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING

### VISION

“A department that can effectively harness its multidisciplinary strength by imparting in- depth knowledge of scientific, technical, legal and social aspects of environment to produce technologically adept Environmental engineers, post-graduates and researchers, that can address emerging challenges to sustainability for the betterment of society.”

### MISSION

- To impart training for capacity building to tackle various Environmental challenges in a sustainable manner.
- To provide holistic education to develop Environment leaders, policy makers and solution seekers.
- To provide interdisciplinary and transformative research in the field of Environmental Science & Engineering.
- To provide technological exposure to the students through industrial training programs.
- To promote outreach activities for public awareness and societal benefit.

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## **ABOUT THE PROGRAM: M.Sc. ENVIRONMENTAL SCIENCES**

The two years M.Sc. course in Environmental Sciences is an interdisciplinary program with an emphasis on emerging areas of environment such as water, air, soil pollution and control, climate change, resource conservation, waste management and environmental impact assessment. The program is designed in such a way that the students get in-depth knowledge of scientific, technical, economic, legal as well as social aspects of environment. The subjects offered are innovative with major thrust being on research areas pertaining to environmental pollution control and treatment technologies. The course will not only equip the students with knowledge and expertise in the area of Environmental Sciences but will also create avenue for research and job opportunities in future.

The purpose of a Learning Outcome-based curriculum Framework is to change the paradigm of higher education from a teacher-centric to learner-centric curriculum. Environmental Science has been developed as a discipline of interdisciplinary nature; therefore, explicit learning outcomes against the course would provide a direction to the students and teachers to focus effectively on the subject. It is hoped that this paradigmatic change will bring about a significant improvement in the quality of higher education and make the learners both competent and confident to face the challenges of a modern competitive world. The philosophy of this new curriculum framework is to realize that it is not sufficient for institutions of higher learning to produce good humans and responsible citizens of the country but also to produce employed graduates and postgraduates.



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## PROGRAM OUTCOMES OF PG PROGRAM OF FACULTY OF SCIENCES

<b>PO1</b>	<b>Knowledge</b>	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
<b>PO2</b>	<b>Research Aptitude</b>	Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis
<b>PO3</b>	<b>Communication</b>	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
<b>PO4</b>	<b>Problem Solving</b>	Capability of applying knowledge to solve scientific and other problems
<b>PO5</b>	<b>Individual and Team Work</b>	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings.
<b>PO6</b>	<b>Investigation of Problems</b>	Ability of critical thinking, analytical reasoning and research-based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
<b>PO7</b>	<b>Modern Tool usage</b>	Ability to use and learn techniques, skills and modern tools for scientific practices
<b>PO8</b>	<b>Science and Society</b>	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
<b>PO9</b>	<b>Life-Long Learning</b>	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
<b>PO10</b>	<b>Ethics</b>	Capability to identify and apply ethical issues related to one's work, avoid unethical behavior such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work
<b>PO11</b>	<b>Project Management</b>	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

*Anib*

*Samir*

*Rejo*

## PROGRAM SPECIFIC OUTCOMES (PSOs)

The program specific outcomes (PSO's) are the statement of competencies/abilities that describe the knowledge and capabilities of the post-graduate will have by the end of program.

After successful completion of M.Sc. Environmental Sciences, the students will be able to

<b>PSO1</b>	Acquire in-depth knowledge and coherent understanding of pathways, principles and phenomenon related to Environmental issues and develop related skills
<b>PSO2</b>	Ability to develop analytical skills and apply statistical methods, ICT and instrumentation techniques for environmental analysis and compilation of scientific data
<b>PSO3</b>	Ability to design and execute environmental projects, write scientific reports, develop research and communication skills, and contribute in environment management
<b>PSO4</b>	Ability to apply scientific knowledge and experimental skill-based environmental strategies and techniques to solve the environmental pollution problems and for sustainable development
<b>PSO5</b>	Ability of have robust foundation enabling students to venture into research in front-line areas of Environmental Sciences, and career in teaching, research and development, government/public services.

Anil

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Sanjay

Rejo

**J.C BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA FARIDABAD  
DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING**

**SCHEME OF M.Sc. ENVIRONMENTAL SCIENCES**

**(w.e.f. Academic Session 2021-22)**

**SEMESTER I**

S. No.	Subject Code	Title	L	T	P	Sessional Marks	Final Exam Marks	Total	Credits	Category code
1	EVS 101B	Ecology and Biodiversity	4	0	0	25	75	100	4	DCC
2	EVS 102B	Environmental Chemistry	4	0	0	25	75	100	4	DCC
3	EVS 103B	Instrumental Techniques for Environmental Analysis	4	0	0	25	75	100	4	DCC
4	EVS 104B	Environmental Geosciences	4	0	0	25	75	100	4	DCC
5	EVS 105B	Statistical methods and Data Analysis	3	0	0	25	75	100	3	DCC
6	EVS 106B	EVS – Lab I (Ecology)	0	0	6	30	70	100	3	DCC
7	EVS 107B	EVS – Lab II (Environmental Chemistry & Analysis)	0	0	6	30	70	100	3	DCC
8	XXX	Human Values and Professional ethics								VAC*
9	XXX	MOOC**								MOOC
		<b>Total</b>	<b>19</b>	<b>0</b>	<b>12</b>	<b>185</b>	<b>515</b>	<b>700</b>	<b>25</b>	

DCC – Discipline Core Course; VAC - Value Added Course; MOOC – Massive Open Online Course; L – Lecture; T - Tutorial; P - Practical

\*The value-added course is compulsory and of 35 hours duration. Its evaluation will be done through Viva-Voce examination only by the Department.

\*\*The students have to pass at least one mandatory MOOC course with 3-6 credits (12-16 weeks) from the list given on the Swayam portal or the list given by the department/ university from 1<sup>st</sup> semester to 4<sup>th</sup> semester as notified by the university. (Instructions given at the end)

*Anto* *Rcpl*  
*MS* *Smila* *Samit*

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**SEMESTER II**

S. No	Subject Code	Title	L	T	P	Sessional Marks	Final Exam Marks	Total	Credits	Category code
1	EVS 201B	Air & Noise: Pollution and Abatement	4	0	0	25	75	100	4	DCC
2	EVS 202B	Water Pollution and Control Technologies	4	0	0	25	75	100	4	DCC
3	EVS 203B	Soil Science and Eco-Agriculture	4	0	0	25	75	100	4	DCC
4	EVS 204B	Energy and Environment	4	0	0	25	75	100	4	DCC
5	EVS XXX	*Elective I	4	0	0	25	75	100	4	DEC
6	EVS 208B	EVS – Lab III (Water and Soil Analysis)	0	0	6	30	70	100	3	DCC
7	EVS 209B	EVS – Lab IV (Air and Noise: Sampling and Analysis)	0	0	6	30	70	100	3	DCC
8	XXX	Audit Course**	2	0	0	25	75	100	0	AUD
		<b>Total</b>	<b>22</b>	<b>0</b>	<b>12</b>	<b>210</b>	<b>590</b>	<b>800</b>	<b>26</b>	
<b>*Discipline Elective Courses (Select any one course from the following)</b>										
1	EVS 205B	Environment Health and Safety	4	0	0	25	75	100	4	DEC
2	EVS 206B	Environmental Microbiology and Biotechnology	4	0	0	25	75	100	4	DEC
3	EVS 207B	Environmental Nanotechnology	4	0	0	25	75	100	4	DEC

DCC – Discipline Core Course; DEC – Discipline Elective Course; AUD-Audit Course

\*Discipline Elective Courses can be offered subject to availability of requisite resources/ faculty in the university/department.

\*\*The students have to choose one Audit course from the list provided by the department/university. Only passing of the Audit course will be mandatory.

\*\*\*Industrial Training (4-6 weeks) to be undertaken in industries, institutes, organizations, etc. or field work to be done at the end of IInd Semester and it will be evaluated in IIIrd Semester.



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**SEMESTER III**

S. No.	Subject Code	Title	L	T	P	Sessional Marks	Final Exam Marks	Total	Credits	Category code
1	EVS 301B	Industrial Water and Wastewater Treatment	4	0	0	25	75	100	4	DCC
2	EVS 302B	Solid and Hazardous Waste Management	4	0	0	25	75	100	4	DCC
3	EVS XXX	*Elective II	4	0	0	25	75	100	4	DEC
4	EVS XXX	*Elective III	4	0	0	25	75	100	4	DEC
5	EVS 307B	Entrepreneurship	2	0	0	50	-	50	1	DCC
6	EVS 308B	Seminar	1	0	0	50	-	50	1	DCC
7	EVS 309B	EVS – Lab V (Industrial Pollution Management)	0	0	6	30	70	100	3	DCC
8	EVS 310B	EVS – Lab VI (Waste Management)	0	0	6	30	70	100	3	DCC
9	EVS 311B	**Industrial Visit/ Field Work and Report Writing	0	0	1	50	-	50	1	DCC
10	XXX	***Open Elective	3	0	0	25	75	100	3	OEC
		<b>Total</b>	<b>22</b>	<b>0</b>	<b>13</b>	<b>335</b>	<b>515</b>	<b>850</b>	<b>28</b>	
<b>*Discipline Elective Courses: Select any two courses from the following:</b>										
1.	EVS 303B	Environmental Impact Assessment and Auditing	4	0	0	25	75	100	4	DEC
2.	EVS 304B	Natural Hazards and Disaster Management	4	0	0	25	75	100	4	DEC
3.	EVS 305B	Natural Resource Management	4	0	0	25	75	100	4	DEC
4.	EVS 306B	Environmental Issues and Legislation	4	0	0	25	75	100	4	DEC

DCC – Discipline Core Course; DEC – Discipline Elective Course; OEC – Open Elective Course

*Ant*      *Rpp*      *Somik*  
*MS*      *Smita*

\*Discipline Elective Courses can be offered subject to availability of requisite resources/ faculty in the university/department.

\*\*Industrial Training (4-6 weeks) to be undertaken in industries, institutes, organizations, etc. or Field work to be done at the end of II<sup>nd</sup> Semester and their assessment would be done in III<sup>rd</sup> Semester.

\*\*\*The students have to choose one Open elective course related to another branch of Science/Engg. /other discipline required for enhancing professional performance as provided by the department/university.

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**SEMESTER IV**

S. No.	Subject Code	Title	L	T	P	Sessional Marks	Final Exam Marks	Total	Credits	Category code
1	EVS 401B	Industrial Training Research Project/ Dissertation	0	0	40	150	350	500	20	DCC

DCC – Discipline Core Course

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Smita

Smita

**Instructions to the students regarding MOOC**

1. Two types of courses will be circulated: branch specific and general courses from the website <https://swayam.gov.in> in the month of June and November every year for the forthcoming semester.
2. The department coordinators will be the course coordinators of their respective departments.
3. Every student has to pass a selected MOOC course within the duration as specified below:

<b>Programme</b>	<b>Duration</b>
B. Tech.	Sem. I to Sem. VIII
M.Sc./M.Tech./MA/MBA	Sem. I to Sem. IV
B.Sc./MCA	Sem. I to Sem. VI

The passing of a MOOC course is mandatory for the fulfilment of the award of the degree of concerned programme.

4. A student has to register for the course for which he is interested and eligible which is approved by the department with the help of course coordinator of the concerned department.
5. A student may register in the MOOC course of any programme. However, a UG student will register only in UG MOOC courses and a PG student will register in only PG MOOC courses.
6. The students must read all the instructions for the selected course on the website, get updated with all key dates of the concerned course and must inform his/her progress to their course coordinator.
7. The student has to pass the exam (online or pen-paper mode as the case may be) with at least 40% marks.
8. The students should note that there will be a weightage of Assessment/quiz etc. and final examination appropriately as mentioned in the instructions for a particular course.
9. A student must claim the credits earned in the MOOC course in his/her marksheet in the examination branch by forwarding his/her application through course coordinator and chairperson.



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**DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING**

The Department of Environmental Sciences and Engineering offers the following Audit Courses and Open Elective Courses for the students of other departments:

Course	Subject	Subject Code
<b>Audit Course</b>	1. Environmental Awareness, Policies and Laws	AES 201B
	2. Environmental Pollution and Human Health	AES 202B
	3. Environment and Society	AES 203B
	4. Environmental Issues and Sustainable Development	AES 204B
	5. Waste to Energy	AES 205B
<b>Open Elective Course</b>	1. Waste Management in daily Life	OES 301B
	2. Environmental Conservation	OES 302B
	3. Environmental Legislation and Policies	OES 303B
	4. Solid Waste Management	OES 304B
	5. Energy and Environment	OES 305B

1. The students have to choose one Audit course (0 credit) from the list provided by the department/university. Only passing of the Audit course will be mandatory.
2. The students have to choose one Open elective course (03 credits) related to other branch of Science/Engineering/other discipline required for enhancing professional performance as provided by the department/university.