

B. Sc. Environmental Science Programme

2016- 2019

The Center of Higher Learning: M.S.U.

The Maharaja Sayajirao University of Baroda, formerly known as the Baroda College, was founded by late His Highness Shrimant Maharaja Sayajirao Gaekwad III of Baroda in the year 1881. The efforts of establishing a university at Baroda were also initiated by him in 1908. Although Shrimant Sayajirao Gaekwad conceived a residential university at Baroda, it became a reality only during the rule of Late His Highness Shrimant Pratapsinhrao Gaekwad. The Maharaja Sayajirao University of Baroda came into existence on 29th April 1949. Smt. Hansa Mehta was not only the first Vice Chancellor of the University but also the first women Vice Chancellor in the country and second in the world at that time. She played a pioneering role in laying a firm foundation for an educational institution with a glorious tradition. Now it has 89 departments spreading over 6 campuses. Our University feels proud to have an alumnus like Dr. Venkat Ramakrishnan, who was conferred with the Nobel Prize in Chemistry in 2009.

Faculty of Science

With the formation of the university, the Silver Jubilee Science Institute, a part of the Baroda College, was reconstituted as the faculty of Science. Foundation stone of the Silver Jubilee Science Institute was laid by Sir Issac Rufus, then Viceroy and Governor General of India, in the year 1926 and the construction was completed in 1933. Since 1949, the faculty offers courses leading to B.Sc., M.Sc. and Ph.D. degree in Botany, Chemistry, Geography, Geology, Mathematics, Physics, Statistics and Zoology. The Faculty added thereafter two more departments: Departments of Biochemistry and Microbiology Biotechnology and Genome Research Centre are known for their excellent work in whole of western India. Different regular and self-financed courses are available for the students in ten departments.



About the Programme

There is increasing awareness and concern of society regarding environmental issues. Natural disasters like earth quake, which occurred in Kutchch on 26th January 2001 and the rarest of the rare, a powerful earth quake and a devastative tsunami, led to a serious disaster in Fukushima, Japan, on 11th March 2011 causing misery to thousands of people. Environmental planning and management can reduce the damage both to the material and human lives. Every industry today realizes the necessity to control the environmental pollution resulting from industrial processes. At present these are tackled by chemists, biologists, engineers and others who are not, by training, competent enough to take a holistic view of environment. The need to generate a trained body of manpower, who can provide the necessary expertise in environmental issues and who have a basic understanding of the environment in its totality, is being widely felt. Conservation of natural resources like fossil fuels, water, soil, and minerals and protecting biodiversity losses are to be better understood and practiced. Protection of forests is to be done on priority basis which can make this planet a healthier place to live.

Credit based 3 – year degree course in Environmental Science provides the basic training needed to generate technically competent man-power. The course is inter-disciplinary in nature and is being taught by experts from various branches of Science and Technology. Comprehensive understanding of the physical, chemical

and biological mechanisms, working under natural conditions and the alterations brought about by human interventions is aimed to be developed through this course by adopting an interdisciplinary approach. Regular practicals and industrial training imparted in last semester makes them competent enough to handle various environmental issues at work place.

Outline of the Course

The syllabus for the course has been designed to provide basic knowledge about the relevant branches of Science that contribute towards the understanding of the environment and ultimately facilitate environment management. In the first two semesters, all elements involved in the environment have been introduced. In the third and fourth semesters, the aim is to create a more advanced level of understanding and the role of various natural and human factors in the environmental issues are taught. Fifth semester deals with the environmental problems, the methods of their assessment, the laws and policies in vogue to protect the environment and provide an overview of the techniques for the solution of environmental hazards. The final semester involves practical experience in industries or an organization of repute along educating the students for scientific writing.

Teaching Programme

- Semester and credit system will be followed for B.Sc. Environmental Science.
- Each year will be divided into two semesters.
- In each semester there will be at least 15 weeks of teaching (including practical).
- In each semester (except in the last or the sixth semester) there will be six theory courses each of 3 credits and three practicals each of 2 credits.
- In the sixth semester the candidate will be assigned project work based on placement in industry /institution or other organization and a 3 credit theory for Scientific Writing and Communication enabling the students to do better in academics.

TEACHING AND EXAMINATION SCHEDULE

Weeks	Activity details
15	Teaching from the date of commencement of a semester (including internal test of theory and practical).
1	Preparation time for the end semester examination.
4	Theory and practical end semester examination.
Total 20	For Each Semester
3	Mid-term break
20	Teaching/examination of 2nd semester of a year
7	Summer vacation
2	Admission process etc.
Total 52	Per Academic Year

Evaluation scheme

A. Theory:

- There will be mid semester and end semester examination.
- Mid semester exam will have 30 % weightage.
- Question paper of each semester will have 30 % objective component and 70% subjective components.
- Theory syllabus of each course is having units and the question paper will cover all the units and will offer choice within the units.

B. Practicals: Totally internal with continuous evaluation.

STANDARD OF PASSING / CLASS

1. Individual course will be a separate passing head. To pass any course a student has to earn at least 4 Grade points in that course.
2. A candidate will be allowed to go to next semesters even if the candidate has failed to pass the courses of previous semester but will not be awarded the degree unless and until he/she passes all the courses of all the semesters.
3. In Third Year (6th Semester), a student will be required to complete a project work (12 credit) during the final semester. The evaluation of the project work will be done partly by the industry where the project is conducted and partly by the internal guide. In addition, a student will have to present a seminar on any allotted environmental issue. Apart from this the student has to pass a 3 credit course in the last semester.
4. A comprehensive viva-voce of 02 credits will be conducted with the help of external examiners, at the end of the course.

AWARD OF CLASS

- A student will be given grades both during mid semester exams and also during end semester exams.
- A grade point system comprising of 11 points (0 to 10) will be followed for evaluating a candidate in each course.
- The mark sheet of semester I to V will not indicate a class. It will simply indicate result as either pass or fail or ATKT
- CGPA will be calculated for courses of 1 to 6 Semester for awarding class as shown below
- A student will be awarded **B.Sc. Environmental Science Degree** only after passing all the semester examinations.

CGPA	CGPA<4	4≤CGPA<5	5≤CGPA<6	6≤CGPA<7	CGPA≥7
Class	Fail	Pass	Second	First	Distinction

- Marks and corresponding Grade Point

Grade Points	CGPA	Range GP
0 - 39.9	< 4 = Fail	0 – 3.9
40 - 49	5	4.0-4.9
50 - 59	6	5.0 -5.9
60 - 69	7	6.0 -6.9
70 - 79	8	7.0 – 7.9
80 - 89	9	8.0 - 8.9
90 - 100	10	9.0 - 10

Syllabus of B.Sc. Environmental Science 2016-19

<u>1st Year B.Sc.Environmental Science</u>					
Code	Semester I	Credit	Code	Semester II	Credit
ENV 1111	General English	03	ENV 1211	Communication Skills	03
ENV 1112	Physical Environment I	03	ENV 1212	Physical Environment II	03
ENV 1113	Basic Plant Science I	03	ENV 1213	Biological Environment I	03
ENV 1114	Basic Plant Science II	03	ENV 1214	Biological Environment II	03
ENV 1115	Basic Animal Science I	03	ENV 1215	Basic of Chemistry	03
ENV 1116	Basic Animal Science II	03	ENV 1216	Nature of India's Environment-I	03
ENV 1117	Practical : Geoscience	02	ENV 1217	Practical : Geoscience	02
ENV 1118	Practical : Botany	02	ENV 1218	Practical: Biology	02
ENV 1119	Practical : Zoology	02	ENV 1219	Practical: Chemistry	02
ENV 1120	Field Work/Industrial visit	01	ENV 1220	Field Work/Industrial visit	01
Total		25	Total		25

<u>2nd Year B.Sc.Environmental Science</u>					
Code	Semester III	Credit	Code	Semester IV	Credit
ENV 1311	Analytical Techniques	03	ENV 1411	Statistical Analyses & Data Presentation	03
ENV 1312	Basics of Chemistry II	03	ENV 1412	Population, Dev. & Environment I	03
ENV 1313	Nature of India's Environment II	03	ENV 1413	Population, Dev. & Environment II	03
ENV 1314	Environmental Botany	03	ENV 1414	Environmental Chemistry I	03
ENV 1315	Environmental Microbiology	03	ENV 1415	Environmental Chemistry II	03
ENV 1316	Environmental Zoology	03	ENV 1416	Environmental Biology	03
ENV 1317	Practical: Basics of Remote Sensing (RS) & land use studies	02	ENV 1417	Practical: Environ. Chemistry I	02
ENV 1318	Practical :Microbiology	02	ENV 1418	Practical: Environ. Chemistry II	02
ENV 1319	Practical: Biology	02	ENV 1419	Practical: Environ. Biology	02
ENV 1320	Field Work/Industrial visit	01	ENV 1420	Field Work/Industrial visit	01
Total		25	Total		25

3rd Year B.Sc. Environmental Science					
Code	Semester V	Credit	Code	Semester VI	Credit
ENV 1511	Computer Application & RS	03	ENV 1611	Scientific Writing & Communication	03
ENV 1512	Environmental Hazards & Disaster Management	03	ENV 1612	Field Work/Industrial visit	01
ENV 1513	Pollution I Air & Noise	03	ENV 1613	Dissertation/project work	12
ENV 1514	Pollution II Water & Waste Water	03	ENV 1614	Seminar	01
ENV 1515	Pollution III-Solid & Hazardous	03	ENV 1615	Viva Voce	02
ENV 1516	Concept of environment management system and legislation	03			
ENV 1517	Practical I Air pollution	02			
ENV 1518	Practical II Water pollution	02			
ENV 1519	Practical III Solid Waste	02			
ENV 1520	Field Work/Industrial visit	01			
Total		25	Total		19
Total of all the semesters					144

Course Staff

Existing faculties from the departments of Biochemistry, Botany, Chemistry, Geography, Geology, Microbiology, Physics, Statistics, Zoology, Medicine, Economics, English, Civil Engineering and Environmental Engineering of the M.S. University of Baroda are involved in regular theory lectures and practicals. Experts from the other universities are also being invited from time to time. Specialists from companies and environmental organizations and applied science organizations are also invited to deliver technical talks.

Facilities Available

- Laboratories:** A separate Environmental Science laboratory with state of the art facilities has been set up. The equipments present there include amongst others:
 - UV – Visible spectrophotometer (Shimadzu)
 - Gas Chromatograph (Shimadzu)
 - Portable Spectrophotometer based water analysis kit
 - High Volume Sampler
 - Laminar Flow Hood
 - Gas analyser
 - Atomic Absorption Spectrophotometer
- Class Rooms:** Class rooms are fitted with audio visual equipments.
- Computer laboratory:** An air conditioned computer laboratory with 15 computers and internet facility is also available for the use of students.
- GIS Mapping System:** GIS and Remote Sensing studies are an important component of the course. GIS solutions and image processing systems are available for practical applications to the students.
- Library:** Smt. Hansa Mehta library, which is one of the 15 largest libraries in the country, has a large number of books and journals and an excellent reading room facility. A separate library for Environmental Science students has been developed in the department.
- Campus is having **Wi-Fi**.

Training: Students visit industries to acquaint themselves with environment related issues. In 6th Semester, the students are deputed to an industrial unit/environment related organization for practical training. Some of the organizations where practical training is being conducted include the following:

- Indian Oil Corporation, Vadodara
- Reliance Industries Limited, Vadodara
- CEPT, Ahmedabad
- Gujarat State Fertilizers Corporation (GSFC) Limited
- Gujarat Alkalies and Chemicals Limited
- Alembic Limited, Vadodara
- Paramount Pollution Control Ltd., Vadodara
- Kadam Environmental Consultants, Vadodara
- CETP, Nandesari
- Novodigm Limited, (Rubamin Pharmaceuticals), Vadodara
- Transpek Industry Limited
- Transpek Silox Industries, Atladra
- ONGC, Mehsana and unit of ONGC Hazira plant
- Bayers Crop Science Limited, Ankleshwar
- Space Application center (SAC) ISRO Ahmedabad
- Vadodara Mahanagar Seva Sadan
- Gujarat Mineral Development Corporation, Ahmedabad
- Gujarat State Forest Development Corporation, Vadodara
- Gujarat Pollution Control Board, Vadodara
- Central Pollution Control Board, West Zone Office, Vadodara

Admission Criteria

1. Eligibility for Admission: A candidate must have passed Gujarat H.S.C. Examination (10+2) or an equivalent examination from the Science stream with English as one of the subjects.
2. A candidate who has passed an equivalent examination from any other examining body will have to obtain eligibility certificate from The Maharaja Sayajirao University of Baroda.
3. **The Online Application Form will be available** at our website <http://www.msubaroda.ac.in> and <http://msub.digitaluniversity.ac> on or before the prescribed date i.e. **06-06-2016, Monday**. The application fee is payable online or by the DD of INR 600/- payable to the Registrar, M.S. University of Baroda.
4. The receipt of the online application need to be produced at the time of the admission process along with the original certificates.
5. Announcement regarding admission to the course will be made through a press note in both English and Vernacular language newspapers.
6. Entrance test will be conducted by the Faculty to decide the admissions to the course on merit basis.
7. Entrance test is compulsory for all those, who are desirous to take admission in First Year.
8. Reservation rules of the University/ Gujarat Govt. will be followed while granting the admissions.
9. Admission will be confirmed only on payment of necessary fee.

Maximum intake

- Total number of seats available for admission is **60**.

Fee Structure

- **First year (Tuition Fee) Rs 20,000.00**
- **Second Year (Tuition Fee) Rs 20,000.00**
- **Third Year (Tuition Fee) Rs 20,000.00**

- Full amount of fees of every year will be collected from the candidate in the beginning of the academic year.
- No part payment is allowed.
- **Fees once paid by any student will not be refunded or transferred.**

In addition to tuition fee, students will be required to pay the following fees per year.

Particulars	Amount Rs.
Faculty/College development and maintenance fund	750
University development and maintenance fund	1750
Library and learning resources	200
Internal assessment fund	1000
Facilities and service charges	5050
Academic activities fund	1000
MSU union membership	25
Facilities/college student association fees	25
Sports and Physical Education Activities fund	50
Economically disadvantaged students support fund	450
Other Fees	7200
Total	17500

Examination Fees per Semester: As per University Rules

Extra Curricular Activities

- The department organizes World Environment Day on 5th June every year. An elocution competition was organized in 2015, students from various schools and university participated.
- Students participated in Open House organized by the Faculty on the occasion of Diamond Jubilee Celebration of Maharaja Sayajirao Gaekwad III on 3rd – 4th January 2016.
- In each semester, the students visit several Industries to understand the working of their CETP's, Solid Waste Management Systems, and Environmental Management etc.
- Students of B.Sc. visited Phansad wild-life Sanctuary, Sanjay Gandhi National Park and Lavasa.

Other Highlights of the Programme

- Field / Industrial visit is must for all the 6 Semester students in Industries or organizations of repute.
- Students are encouraged in various environment related activities. During the year 2015, Ambient Air Quality monitoring in Vadodara city was done during Deepawali in collaboration with CPCB, West Zone.
- Regular Seminars on current environmental issues by invited experts and faculty members are organized.
- We work and inspire the students to work whole heartedly to achieve their goals.
- The course is intended for all round personality development of each student along with in depth knowledge about Natural Resources and different Pollution Related Aspects.

We are hopeful that you will join this course with a commitment to protect the Planet Earth.

Important Dates:

Last date for submitting the application form: **06-06- 2016, Monday**

Entrance Test Date: **13- 06 – 2016, Monday at 11:00 AM**

Declaration of Entrance Test Results: **14-06-2016, Tuesday**

Start of regular Classes: **01-07-2016, Friday**

Venue of Entrance Test:

**Environmental Science Building
Behind Geology Department, Faculty of Science
The Maharaja Sayajirao University of Baroda**

Syllabus for Entrance Test

Questions will be based on

A. General English:	20
B. General Knowledge:	20
C. <u>Science:</u>	60
Total:	100

- Questions on General English will include spellings of certain words, antonyms, synonyms, idioms, parts of speech, answering questions based on given paragraph etc.**
- General knowledge questions will be based on History, Geography, Political Science and Current affairs.**
- Science questions will be based on Physics, Chemistry, and Biology up to 12th standard. Few questions may be of Mathematics, Microbiology and Environmental Science.**

For further details please contact:

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