

**UNIVERSITY OF MUMBAI**

**No. UG/119 of 2015-16**

**CIRCULAR:-**

A reference is invited to the Syllabi relating to the M.Sc.degree programme, **vide** this office Circular No. UG/108 of 2013-14, dated 26<sup>th</sup> March, 2014 and the Head, University Department of Bio-Technology and the Principals of affiliated Colleges in Science and the Head of the recognized Science Institutions concerned are hereby informed that the recommendation made by the Faculty of Science at its meeting held on 22<sup>nd</sup> June, 2015 has been accepted by the Academic Council at its meeting held on 26<sup>th</sup> June, 2015 **vide** item No. 4.25 and that in accordance therewith, revised syllabus as per Credit Based Semester and Grading System in the course of M.Sc. Life Science (Marine Biotechnology) Sem. II for Paper VII & VIII (Sindhu Swadhyay Sanstha), which is available on the University's web site ([www.mu.ac.in](http://www.mu.ac.in)) and that the same has been brought into force with effect from the academic year 2015-16. Accordingly the syllabus for Paper I to VI is same as per M.Sc. Life Science.

MUMBAI – 400 032  
5<sup>th</sup> November, 2015

REGISTRAR

To,

The Head, University Department of Bio-Technology and the Principals of affiliated Colleges in Science and the Head of the recognized Science Institutions concerned.

**A.C/4.25/26/06/2015**

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No. UG/119 -A of 2015-16  
2015

MUMBAI-400 032

5<sup>th</sup> November,

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Science,
- 2) The Director, Board of Colleges and University Development,
- 3) The Professor-cum-Director, Institute of Distance and Open Learning (IDOL),
- 4) The Controller of Examinations,
- 5) The Co-Ordinator, University Computerization Centre.

  
REGISTRAR

..PTO

**Sindhu Swadhyay Sanstha**  
**M. Sc. Life Sciences (Marine Biotechnology)**

**Semester – II, Paper – VII: COASTAL AQUACULTURE**

**UNIT-I** 15 HOURS (Credit – 4)

Overview, importance of aquaculture, global scenario, present status in India - prospects and scope.

Aqua-farming systems: traditional, extensive, semi-intensive and intensive; Site selection: topography, water availability and supply, soil conditions, design and layout, structure and construction.

**UNIT- II** 15 HOURS (Credit-4)

Cultivable Species- Seaweeds- (Gracilaria, Gelidiella, Kappaphycus): Finfishes (Asian sea bass, groupers, pearl spot, mullets, milkfish and ornamental fishes). Shellfishes (shrimps, crabs, lobsters, mussels, edible oysters, pearl oysters, clams ).

**UNIT- III** 15 HOURS (Credit – 4)

Culture techniques - monoculture, polyculture - pond, raceway, cages, pens, raft and rope culture.  
Hatchery seed production techniques- breeding, hatchery and nursery phases.

**UNIT-V** 15 HOURS (Credit – 4)

Feed and Feed formulation: Farm conditioning, Conventional and non conventional feed stuffs, feed formulation technology, growth promoting agents in aqua feed, culture of live feed organisms diatoms-brine shrimp, rotifers, - bioenvironmental monitoring- harvesting- control of predators, parasites and diseases - Best management practices in shrimp farming.

**PRACTICALS :** 60 HOURS (Credit – 4)

1. Estimation of Salinity.

2. Estimation of Dissolved Oxygen.
3. Determination of Nitrite, Nitrate and Ammonia
4. Extraction and Estimation of Chlorophyll Primary productivity.
5. Diet preparation of Fishes
6. Diet preparation of prawns
7. Identification of local fishes and shellfishes
8. Identification of Phytoplankton- Diatoms, Dinoflagellates, Blue green algae and Coccolithophores.
9. Identification of Zooplankton- Copepods, Hydromedusae, Pteropods, Chaetognatha, Thaliaceae and planktonic Larvae.
10. Identification of locally available Seaweeds, Seagrasses and Mangrove plants.
11. Methods of sample collection from marine environments: Isolation of bacteria
12. Determination of moisture content of dried fish
13. Microbiological analysis of fish

**Text Books:**

1. Pillay, T.V.R .1990. Aquaculture Principles & Practices. Fishing News (Books) Limited, London.
2. Santhanam R. N. Ramanathan and G. Jegatheesan 1990. Coastal Aquaculture in India, CBS publishers and Distributors.
3. Joachim W., Hertrampf and F.P Pascal, 2000 Handbook on Ingredients for Aquaculture feeds. Kluwer Academic Publishers, London

**Reference Books:**

1. Bardach, John.E. 1997 Sustainable Aquaculture. John Wiley and Sons.
2. Chapman, V.J., 1980. Seaweeds and their uses Chapman and Hall London.
3. Wheaton, F.W. 1977. Aquaculture Engineering. John Wiley and Sons, New York.
4. Stickney, 1995. Principles of Aquaculture, John Wiley & Sons.

## **Semester – II**

### **Paper – VIII: Marine Biotechnology**

#### **UNIT-I**

15 HOURS (Credit – 4)

Biotechnology in marine science - history of marine biotechnology application in aquaculture, pharmaceutical, environment remediation, biofouling and biocorrosion. Developmental biotechnology - induced breeding in-vitro fertilization cryo preservation biotechnological tools - ELISA, FISH, PCR Gene probes, dot immuno binding activity, monoclonal antibodies biosafety ethics.

#### **UNIT-III**

15 HOURS (Credit – 4)

Bioactive marine natural products - membrane receptors, anti tumor compounds, anti inflammatory / analgesic compounds, anti viral agents, isolation and identification of marine bioactive compounds such as labile proteins, toxins, carotenoids bioterminator Commercial development of marine natural products- chitosan, chitin.

#### **UNIT-IV**

15 HOURS (Credit -4)

Algal biotechnology - single cell protein, hydrocolloids, agarose, carrageen alginates and other by products. Marine Enzymes sources and their applications Marine Lipids sources and their applications.

#### **UNIT-V**

15 HOURS (Credit – 4)

Bioinformatics - introduction to computers, Internet and bioinformatics, Bioinformatics servers- (European Bioinformatics Institute, National Centre for Biotechnological Information, DNA Data Bank of Japan), DNA sequence & structural analyses, Basic Logical Alignment Tool, DNA sequence alignment and phylogeny, protein structural analysis, 3D Molecular Visualizer, drug designing.

#### **PRACTICAL:**

PROJECT: Dissertation/ Literature Review

60 HOURS (Credit – 4 )

### **Text Books**

1. Italy, E (Eds). 1998, New Developments in Marine Biotechnology, Plenum Pub. Corp.
2. Milton Fingerman and Rachakonda Nagabhushanam, 1996, Molecular Genetics of Marine Organisms, Science Pub Inc.
3. Y. Le Gal and H.O.Halvorson 1998, New Developments in Marine Biotechnology. Springer.

### **Reference Books**

1. David H. Attaway, 2001. Marine Biotechnology, Volume 1, Pharmaceutical and Bioactive Natural Products.
2. Rita R. Colwell 1984. Biotechnology in the Marine Sciences (Advances in Marine Science & Biotechnology) Wiley Interscience.
3. Scheupr, P.J. (Ed.), 1984. Chemistry of Marine Natural Products, ,Chemical and Biological Perspectives. Vol. I III, Academic Press, New York.