

University of Mumbai



No. AAMS_UGS/ICC/2023-24/55

CIRCULAR:-

The Principals of the Affiliated Colleges, the Head of the University Departments and Directors of the Recognized Institutions in Faculty of Science & Technology is invited to this office Circular No. AAMS (UG)/140 of 2021 dated 25th October, 2021 & No. AAMS_UGS/ICC/2023-24/54 dated 08th August, 2023 relating to the syllabus of M.Sc. (Maritime Studies) (Sem. I to IV) (CBCS).

They are hereby informed that the recommendations made by the Ad-hoc Board of Studies in **Maritime Studies** at its online meeting held on 23rd August, 2022 and subsequently passed by the Board of Deans at its meeting held on 08th December, 2022 vide item No. 8.9 (R) have been accepted by the Academic Council at its meeting held on 06th April, 2023 vide item No. 8.9 (R) and that in accordance therewith, that a paper on Marine Biogeochemistry and Ocean Optics (MSCMS301) given in the revised syllabus of M.Sc. (Marine Science) be offered to the 3rd Semester students (2021-2023 batch only) of M.Sc. (Maritime Studies) program as an elective paper.

(The said circular is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
08th August, 2023


(Prof. Sunil Bhirud)
I/c. REGISTRAR

To,

The Principals of the Affiliated Colleges, the Head of the University Departments and Directors of the Recognized Institutions in Faculty of Science & Technology.

A.C/8.9 (R) /06/04/2023

Copy forwarded with Compliments for information to:-

- 1) The Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies **Maritime Studies**,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Director, Department of Information & Communication Technology,
- 6) The Co-ordinator, MKCL.
- 7) The Deputy Registrar, Admissions, Enrolment, Eligibility & Migration Department (AEM),
- 8) The Deputy Registrar, Result Unit,
- 9) The Deputy Registrar, College Affiliations Development Department (CAD).

Copy for information and necessary action :-

1. The Deputy Registrar, College Affiliations & Development Department (CAD),
2. College Teachers Approval Unit (CTA),
3. The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),
4. The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA)
5. The Deputy Registrar, Research Administration & Promotion Cell (RAPC),
6. The Deputy Registrar, Executive Authorities Section (EA)
He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
7. The Deputy Registrar, PRO, Fort, (Publication Section),
8. The Deputy Registrar, Special Cell,
9. The Deputy Registrar, Fort Administration Department (FAD) Record Section,
10. The Deputy Registrar, Vidyanagari Administration Department (VAD),

Copy for information :-

1. The Director, Dept. of Information and Communication Technology (DICT), Vidyanagari,
He is requested to upload the Circular University Website
2. The Director of Department of Student Development (DSD),
3. The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,
4. All Deputy Registrar, Examination House,
5. The Deputy Registrars, Finance & Accounts Section,
6. The Assistant Registrar, Administrative sub-Campus Thane,
7. The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,
8. The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,
9. P.A to Hon'ble Vice-Chancellor,
10. P.A to Pro-Vice-Chancellor,
11. P.A to Registrar,
12. P.A to All Deans of all Faculties,
13. P.A to Finance & Account Officers, (F & A.O),
14. P.A to Director, Board of Examinations and Evaluation,
15. P.A to Director, Innovation, Incubation and Linkages,
16. P.A to Director, Department of Lifelong Learning and Extension (DLLE),
17. The Receptionist,
18. The Telephone Operator,

Copy with compliments for information to :-

19. The Secretary, MUASA
20. The Secretary, BUCTU.

University of Mumbai



Revised Syllabus for M.Sc. (Maritime Studies)

Paper on Marine Biogeochemistry And Ocean Optics SCMS301)

Semester – (III)

(Choice Based Credit System)

(Only for 2021-2023 Batch)

University of Mumbai



Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of Course	M.Sc. (Maritime Studies) Paper on Marine Biogeochemistry And Ocean Optics (MSCMS301)
2	Eligibility	
3	Duration of Course	2 years
4	Scheme of Examination	
5	Standards of Passing	
6	No. of years/Semesters:	Sem -
7	Level:	P.G. / U.G. / Diploma / Certificate
8	Pattern:	Yearly / Semester
9	Status:	New / Revised
10	To be implemented from Academic Year :	Only for 2021-2023 Batch

Signature:

Dr. Francis P. A.
(Chairman of Board of Studies)

Signature:

Faculty of Dean

Paper on Marine Biogeochemistry And Ocean Optics (MSCMS301)

MSCMS301E Ocean Biogeochemistry and Ocean Optics (4 credit)

UNIT-I Introduction to Ocean Biogeochemistry: (10 hours)

Primary Productivity, Role of nutrients and light, Sverdrup's critical depth concept, New and Regenerated production, Export Production, Biological Pump, Solubility Pump;

UNIT-II Chemical Oceanography: (10 hours)

Chemical composition of seawater, Macro and Micronutrients, Concept of proximate and ultimate limitation, importance of trace elements, Elemental stoichiometry & Redfield ratio, Carbon, Nitrogen, Silicon and Phosphorus cycles, Importance of these elements in Ocean biogeochemistry

UNIT-III Physical-Biological Interactions: (12 hours)

Coupling between physical, chemical and Biological Oceanography, Upwelling and winter mixing, Physical factors controlling marine productivity; ocean food web (phytoplankton to fish and microbial loop); Growth rate of phytoplankton, nutrient limitation, light limitation, Liebig law of minimum, Michaelis-Menton representation, Redfield ratio, photosynthesis, size consideration of phytoplankton (Diazotroph, picoplankton and diatom), zooplankton grazing;

UNIT-IV Oxygen minimum Zones: (4 hours)

Formation, distribution and implications; Deoxygenation of ocean, Dentrification and annamox, Organic matter cycling

UNIT-V Biogeochemistry and Climate linkages: (12 hours)

Ocean Carbon Cycle & Ocean Acidification, Understanding of the chemical, physical, and biological characteristics and processes influencing carbon dynamics in ecosystems, A simple carbon-cycle model, Controlling factors of Ocean Acidification, Ocean acidification and implications for global marine ecosystems.

UNIT-VI Ocean Optics: (12 hours)

Fundamentals of the light/matter; electromagnetic radiation; ocean color; measurements & uncertainties, Optics of marine particles; optically active substances (OAS); inherent optical properties (IOP); apparent optical properties (AOP); remote sensing reflectance; downwelling diffuse attenuation coefficient; effect of OAS on apparent optical properties; vertical propagation of light

References:

1. *"Ocean Biogeochemical Dynamics"* by J. L. Sarmiento and N. Gruber, Princeton University Press
 2. *"Marine Biogeochemical Cycles"*, 2nd Edition, by Rachael James, Open University Publication
 3. *"Fundamentals of Remote Sensing"*, 2nd Edition, by George Joseph, Universities Press.
 4. *"Ocean Biogeochemical Dynamics,"* by Jorge L. Sarmiento & Nicolas Gruber, Princeton University Press.
 5. *"Dynamics of Marine ecosystems: Biological –Physical Interactions in the Oceans"*, 3rd Edition by K.H Mann, John R.N Lazie, Wiley, 2013.
 6. *"Phytoplankton productivity: Carbon assimilation in marine and freshwater ecosystems"*, by Williams, P.J. B, Thomas, D. N, Reynolds, C. SWiley, 2008.
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