SEMESTER - IV

Veer Narmad South Gujarat University

M.Sc. (Aquatic Biology) Semester – IV

Teaching and Examination scheme

Theory Paper /Practical	Teaching schedule Hrs/week	Exam Schedule			Total marks Theory/ Practical	Credit
		Duration (hrs)	Internal marks	Theory / Practical (Uni)		
Theory papers :						
AQB: 401 – Fish Diseases and Management	4	3	30	70	100	4
AQB: 402 – Animal Aquaculture I	4	3	30	70	100	4
AQB: 403 – Animal Aquaculture II	4	3	30	70	100	4
AQB: 404 – Plant Aquaculture	4	3	30	70	100	4
Practicals :						
AQB: 405 – Aquaculture Management	4	5	30	70	100	4
AQB: 406 – Placement and Training	4	5	30	70	100	4
		Total	180	420	600	

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Syllabus

AQB : 401 - Fish Diseases and Management

Unit – I — Hrs 16

Etiology: Physical, chemical and physiological factors in fish diseases,
Techniques for diagnosis of diseases
Therapy of fish diseases: mode of drugs action, Administration of drugs, Use of Antiparasitic, Narcotics, Sedatives, Disinfectants and Chemotherapy of fish

Unit – II — Hrs 10

Pathogenic diseases: Symptoms and their control – Fungal, Bacterial and Viral diseases

Unit – III — Hrs 8

Parasitic diseases: Symptoms and their control – Protozoan, Crustacean, and Worm diseases

Unit – IV — Hrs 6

Non Pathogenic diseases: Symptoms and their control – Algal, Environmental, Nutritional and Hereditary diseases

References:

- Anderson, D.P. (2003): Text book of fish Immunology, Narendra publishing house, Delhi
- Austin, B. (1999): Bacterial fish pathogen-Disease of farmed and wild fish, Paraxis publishing Ltd., U.K
- Conroy, D.A. (1997): Textbook pf fish diseases, Narendra publishing house, Delhi
- Cornell, J.J. (1995): Control of fish quality, Fishing new books
- Duijn, C.V. (2000): Diseases of fishes, Narendra publishing house, Delhi
- Inglis, V. (1993): Bacterial diseases of fish, Blackwell science Ltd., Oxford, U.K.
- Roberts, R.J. (1982): Microbial diseases of fish, Society for general microbiology academic press, New York, USA
- Roberts, R.J. (1978): Fish pathology, Baillere Tindall, Landon
- Schaperclaus, W. (2001) : Fish diseases Vol I & Vol II, Oxonian Press Pvt. Ltd., New Delhi
- Sharma, O.P. (2009): Handbook of fisheries and aquaculture, Agrotech publishing academy, Udaipur
- Wedemeyer, G.K. (1999): Environmental stress and fish diseases, Narendra publishing house, Delhi
- Woo, P.T.K. and Leatheland, F. (1998) : Fish diseases and disorders, CABI publishers, Wallingford

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Syllabus

AQB : 402 – Animal Aquaculture I

Unit – I Hrs 6

Definition, history and scope of aquaculture, constraints and recent advances in aquaculture, criteria for selection of species in aquaculture

Unit – II Hrs 10

Selection of site, designing, layout and construction of aquafarms, types and properties of soil, water supply and drainage systems, aeration in aquaculture, equipments and feeders

Role of Birds and mammals in aquaculture

Unit – III Hrs 12

Carp culture: Preparation of nursery, rearing and stocking ponds, Fertilization, Stocking, Supplementary feeding and harvesting

Composite fish culture

Integrated fish farming

Culture of Murrel

Unit – IV Hrs 12

Culture of freshwater prawns

Culture of catfishes

Trout culture: types of trouts, culture systems, development of brood stock, techniques of propagation and rearing of growouts

Sewage fed fisheries: sewage, treatment, sewage fed fish culture in India

References:

- Bardach, E.J. Rhyther, J.H. & W.O. Mc. Larney. (1972): Aquaculture. The Farming and Husbandry of freshwater and Marine Organisms. John Wiley and Sons. New York
- FAO, (1992): Manual of seed production of carps
- James, P McVey, (1983): Handbook of Mariculture, CRC press, Florida
- Jhingran, V. G. (1991) Fish and Fisheries of India, Hindustan Publishers
- Klontz, G.W., Downey, P.C. and Focht, R.L. (1979): A Manual for Trout and Salmon Production - The Sterling Cup Manual, University of Idaho, Moscow, ID.
- Landau, M. (1992): Introduction to Aquaculture, John Wiley and Sons, New York.
- Leitritz, E. and Lewis, R.C. (1984): Trout and Salmon Culture, State of California, Department of Fish and Game.
- Mathew, L. (1992): Introduction to Aquaculture, John Wiley and Sons, INC, New York
- Pillay, T.V.R. and Kutty, M.N. (2005): Aquaculture – Principles and Practices, Black Well Sciences, U.K.
- Rath, R. K. (2000): Freshwater Aquaculture, Scientific Publishers, Jodhpur

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Syllabus

AQB : 403 – Animal Aquaculture II

Unit – I Hrs 10

Brackishwater finfish culture: Introduction, culture system, harvesting and marketing of important brackishwater fin fish (Mullet, Milk fish and Seabass)

Unit – II Hrs 8

Brackishwater Prawn culture, Types of prawns, Preparation and management of prawn farm (water quality, Stocking, feeding, diseases, harvesting and marketing), bio-security and effluent treatment plant in prawn farming

Unit – III Hrs 12

Mariculture: History and recent advances in mariculture.
Edible oyster culture, Pearl oyster culture, techniques of pearl production
Lobster and Clam culture

Unit – IV Hrs 10

Ornamental fish culture: Status of Ornamental fish trading in India, Design and construction of aquaria, Settingup and management of aquarium
Equipments used in aquaria (Biological filters, aerators, heaters etc.)
Breeding and culture of ornamental fishes.
Transportation of ornamental fishes

References:

- Bardach, E.J. Rhyther, J.H. and W.O. McLarney (1972): Aquaculture. The Farming and Husbandry of freshwater and Marine Organisms. John Wiley and Sons. New York
- Brown, E.E., Gratzek, J.B. (1980): Fish Farming Hand Book. AVI Publishing Company, West port USA
- James, P. McVey (1983): Handbook of Mariculture Vol. I. Crustacean Aquaculture. CRC Press. Inc. Florida; 442 pp.
- Landau, M. (1992): Introduction to Aquaculture, John Wiley and Sons, New York.
- Mathew, L. (1992): Introduction to Aquaculture, John Wiley and sons, INC, New York
- Oren, O.H. (1981): Aquaculture of Grey Mullets. Cambridge University Press, London
- Pillay, T.V.R. and Kutty, M.N. (2005): Aquaculture – Principles and Practices, Black Well Sciences, U.K.
- Takeo, I. (1978): Aquaculture in shallow seas. Progress in shallow. Sea culture, Amerind Publishing Co. Pvt. Ltd. New Delhi. 613 pp.
- Fast, A.W. and Lester, L.J. (1992): Marine Shrimp culture – Principles and Practices. Elsvier Science Publishers, Amsterdams
- Korring, P. (1976): Farming of marine fishes and shrimp. Elsvier Science Publishers, NY

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Syllabus

AQB : 404 – Plant Aquaculture

Unit-1 Hrs 6

Plant aquaculture: History, principles, scope and importance.
Important cultivable species of aquatic plants and sea weeds, micro algae

Unit-2 Hrs 12

Biodiversity of Seaweeds along the coast of India and Gujarat,
Taxonomy of economically important seaweeds.
Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques of sea weeds (Gracilaria, Ulva)
Products from seaweeds

Unit-3 Hrs 12

Biodiversity of freshwater higher vascular plants in India and Gujarat,
Taxonomy of economically important freshwater higher vascular plants.
Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques of freshwater higher vascular plants (Trapa, Typha), products of higher vascular plants
Reed bed technology in waste water treatment

Unit-4 Hrs 10

Biodiversity of micro algae in India and Gujarat
Taxonomy of economically important micro algae.
Distribution, morphology, reproduction, life cycle, growth physiology and Culture techniques and Importance of Spirulina and chlorella
Application of microalgae in water treatment and Bioremediation

References

- Chapman, V.J. and Chapman, P.J. (1980): Seaweeds and their uses. Chapman and Hall with Methuen Inc., New York.
- Dawes, C.J. (1981): Marine Botany. John Wiley and sons.
- Dawson, R.Y (1966): Marine Botany. An Introduction Holt, Reinhart and Winston Inc., U.S.A.
- Desikachary, T.V. (1975): Marine Plants. C.S.I.R., New Delhi.
- Dring, M.J. (1982): The Biology of Marine Plants. Edward Arnold Publishers, London.
- Levring, T. (1981): Proceedings of 10^{th} International seaweed symposium, Goteborg, Sweden, Academic Press Walter de Guyter, Berlin
- Kapraun, D.F. (1980): An illustrated guide to the benthic marine algae of coastal North Carolina- Rhodophyta. University North Carolina Press.
- Lewis Hansard Tiffany (1968): Algae the Grass of many waters. Blackwell scientific publications Ltd., Oxford.
- Pixon, P.S. (1982): The Biology of Rhodophyta. Oliver and Boyd, Edinburgh.
- Round, F.E. (1981): The Ecology of the Algae, Cambridge University Press.

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Syllabus (Practical)

AQB : 405 – Aquaculture Management

- Preparation of media
- Isolation and identification of pathogenic bacteria from fish.
- Study of permanent slides (pathogens and parasites).
- Study of diseased specimens.
- Identification of seaweeds, higher vascular plants.
- Identification of cultivable fin fishes, shell fishes, predatory and weed fishes.
- Identification of seed stages (eggs, spawns, fry and fingerlings)
- Identification of aquatic insects and prawn larvae.
- Identification of aquatic weeds (marine and fresh water).
- Setting of an aquarium
- Visit to aquafarms

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Syllabus (Practical)

AQB : 406 – Placement and Training

Under this practical programme each student has to join and work in an aquafarm / aquaindustry or organisation working in the field(s) Aquatic Biology mentioned in syllabus, minimum for two weeks during the second year. The aim of this programme is to enhance confidence of student, gain practical knowledge and experience of the subject and getting better chance for employment.

The placement agency is expected to send the report of student related to his/her performance, ability, attendance punctuality and interest at the end of the programme.

Simultaneously, student also has to submit the report for his/her experience and feedback. The agency's report will be considered at the time of practical exam. Pracitcal exam for this will carry the same weigtage of marks. In exam the reports of the placement agency and student would be considered and would be followed by viva voce.

Expenditure during this programme would exclusive be borne by the student. The Department or the university will pay not bear any cost. However stipenend or financial help from other sources would be accepted and appreciated.