190 – FISHERIES

Aims and Objectives

This subject id designed to:

1. acquaint students with the knowledge of physical geography and its relevance to fisheries science.
2. introduce students to the general overview of fisheries.
3. acquaint students with the general principle of aquaculture particularly as it affects warm water fish species;
4. teach students the basic principles of designing, constructing, and using common fishing gear and crafts in Nigeria;
5. enable students understand the basic design and construction of simple fish culture facilities and how to maintain them.
6. acquaint the students with the knowledge of fish handling preservation, processing and marketing.

Examination Structure

There will be two papers:

190-1 – PAPER I : This will consists of two sections, viz:

SECTION A: OBJECTIVE: this will be forty (40) multiple choice questions. Candidates will be required to answer all in 40 minutes. This section carries forty (40) marks.

SECTION B: ESSAY: this will be a written paper of six questions. Candidates are to answer four questions in 2 hours. This Section carries sixty (60) marks.

190-2 PAPER II: PRACTICAL: This will comprise of two (2) compulsory Practical Questions for a duration of three (3) hours; and it carries 100 marks.

FIT 13 – INTRODUCTION TO PHYSICAL GEOGRAPHY

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	The relevance of Physical Geography to Fisheries.	1. Definition of Physical Geography 2. Components of Physical Geography relevant to fisheries sciences. 3. The components of fisheries science. 4. Types of environment in which fishes lives. 5. The physical and chemical characteristics of the following: a. fresh water b. brackish water c. marine water 6. Identification of lakes, estuaries and deltas in natural situations and maps. 7. Differences between lakes, rivers, lagoons and estuaries.	1. Lectures
2.	Name and locations of continents, oceans and relief features of the basin in the world	1. The world map 2. The ocean of the world on map 3. Differences between mountains, hills, valleys and other land configuration. 4. Explanation of land configuration to types of lakes, rivers and other water bodies.	Lectures
3.	Weather Instruments	1. The use of the following instruments: d. rain guage e. thermometer f. hygrometer g. barometer h. wind vane i. sunshine recorder 2. The use of weather records to fisheries science.	1. Demonstrate the use of instruments of taking weather records listed. 2. Lecture on the importance of taking weather records to fisheries science.
4.	Forms of life in Aquatic Environments	1. Importance of phytoplankton and zooplankton in aquatic environment 2. Identification and drawing important invertebrates (crustaceans mainly) 3. Explanation of importance of crustaceans in aquatic environment. 4. Identification of fin and shell fishes in the sea and their adaptive features. 5. Identification of common aquatic weeds in Nigeria.	1. Show students samples of fin fishes and shell fishes found in the sea and describe their adaptive features. 2. Show students collections of aquatic weeds.

FIT 21 – INTRODUCTION TO FISHERIES

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	Basic Fish Biology	1. Identify different types of fish. 2. Fish grouping into: a. Fin Fish b. Shell Fish c. Bony/Cathogeneous fish d. Habitat (Ecology) fish 3. External Features of fish and their functions. 4. Internal Features of fish and their functions. 5. Growth, feeding and reproduction of fish.	1. Lectures
2.	Fisheries Development in Nigeria.	1. Importance of fish in human nutrition. 2. History of development of fisheries Industry from pre-independence Nigeria to date. 3. Status of fisheries resources production in Nigeria economy. 4. The roles of the following fisheries sub-sector economy: a. Artisanal (Subsistence, Small-Scale and Commercial) b. Industrial c. Aqua-Culture. 5. Problems associated with each sub-sector. 6. Possible solutions.	Lectures and show of documentary on fisheries sub-sector economy.
3.	Concept of Fisheries Technology	1. Explanation of the following concepts a. Fish technology b. Fishing technology c. Fisheries technology.	Lectures
4.	Fish Classification	1. Basic Principles of fish classification. 2. The difference between fin fishes and shell fishes. 3. Main groups of Nigerian fishes (marine, Brackish water and fresh water species) and their diagnostic features as well as main characteristics.	Show samples from the fish types
5.	External Morphology of Bony fish.	1. Morphmetric or meristic characters of fish i.e. standard length, total length, trunk, head girth, head trunk and tail region of a typical fish. 2. Different types of fish scales - Ctenoid, Ganoid, Cydoid and Placoid. 3. Methods of identifying and drawing fish skin.	1. Laboratory measurement of fish. 2. Identification and drawing of fish scales.] 3. Prepare slides and documentaries of fish skin.
6.	Internal Features of Bony Fish.	1. Identifying the following feature of a fish. a. The elementary canal and associated structures - mouth,	1. Laboratory dissection of fish showing different parts of the alementary canal from mouth to anus.

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
		teeth, pharynx, esophagus, stomach, intestine, pancreas, liver, kidney, spleen gas bladder, gills, gonads and heart of fish. b. Dissecting and drawing to scale fish alimentary canal relative to body length.	2. Guide students to dissect and measure alementary canal relative to length.
7.	Fisheries development in Nigeria.	1. Fisheries sub-sector in Nigeria: a. Artisanal (Subsistence, Small-scale and commercial) b. Industrial c. Aqua-Culture	1. Show students documentary on the listed fisheries sub-sector. 2. Conduct class visits to landing site, fish farm and cold room.

FIT 22 – BASIC AQUACULTURE

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	Aquaculture	1. Definition of aquaculture. 2. History of aquaculture with particular reference to Nigeria, the present status and its prospects in future. 3. The potential of aquaculture in boosting fish production in Nigeria. 4. Identification of major fish types in Nigeria, fish seed, table fish, ornamental fish, shall fish. 5. Key species of fish cultured in Nigeria.	- Lectures - Show students preserved or fresh culturable and non-culturable fish and shell fish species. - Guide students or the characteristics of the different species for easy identification.
2.	Fish Culture Systems	1. Definition of extensive, semi-intensive and intensive farming systems. 2. The differences betweens extensive, semi-intensive and intensive fish farming systems. 3. Various facilities for the culture of fish.	Take students toi see different fish farming facilities.
3.	Natural and supplementary fish feeds in ponds.	1. Explanation on natural and supplementary fish feeds. 2. Methods for the production of natural fish food. 3. Procedure for compounding simple fish rations. 4. Locally available common fish feed stuffs. 5. Practical feeding of fish. 6. Production of fish feed pellets. 7. Packaging of fish feed pellets.	- Lectures on feed formulation. - Conduct practical with students on compounding feed ratio, feeding fishes in ponds and packaging fish feed pellets.
4.	Enemies of fish under culture.	1. Definition of water pollution. 2. Identifying ways of dealing with problems of water pollution in fish culture. 3. Simple methods of improving water quality. 4. Identifying fish predators and control. 5. Identifying aquatic weeds and control. 6. Common fish diseases and parasites and how to control them.	- Lectures - Show different aquatic weeds associated with pound culture to students.
5.	Construction and management of aquarium.	1. Definition of aquarium. 2. Materials for construction of an aquarium. 3. Types of aquaria (natural & artificial). 4. Some of the natural plants found in an aquarium. 5. Some common ornamental fishes found in an aquarium. 6. Common fish feed used in aquaria. 7. Methods of maintaining acquaria.	

FIT 22 – BASIC AQUACULTURE
(PRACTICAL CONTENT)

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	Aquaculture	1. Key species of fish cultured in Nigeria. 2. Major fish types in Nigeria fish seed table fish, ornamental fish, shell fish. 3. Different culturable fish species: a. Tilapia b. Clarias c. Heterobrachus d. Cyprinus Caspio e. Heterotis nitotians	- Show students preserved or fresh culturable and non culturable fish and shell species. - Guide the students on the characteristics of the different species for ease of identification. - Conduct practical on characteristics of culturable and non-culturable species (fin fish and shell fish).
2.	Types of fish culture system	1. The facilities for the culture of fish. 2. Preparation of ponds for stocking. 3. Stock pond as desired 4. Methods of compounding simple fish ratio. 5. Practical feeding of fish.	- Take students to see different fish farming facilities. - Guide students in pond preparation for stocking. - Conduct practical with students on compounding ratio and feeding fishes in ponds
3.	Fish seed production.	1. Packaging fish fry/finger lings for transportation. 2. Definition of hypophysation of fish.	- Demonstrate packaging of fish fry/fingerlings for transportation. - Demonstrate hypophysation of fish
4.	Fish harvesting	1. Equipment used for harvesting fish by a. partial and b. total cropping. 5. Methods of harvesting and crop fishing by total or partial cropping.	- Guide the students in harvesting fish by partial and total cropping.
5.	Enemies of fish underculture	1. Fish predators and minor control. 2. Aquatic weed. 3. Common Fish diseases and parasites and how to control them.	- Guide Students in identifying fish predators and aquatic weeds in existing ponds. - Guide students to observe diseased fishes e.g. fungi infection, bloat fin rot etc.
6.	The Construction of Aquarium	1. Materials for construction of an aquarium. 2. Types of aquarium (natural & artificial). 3. Natural plants found in an aquarium. 4. Common fish seed used in aquaria. 5. Common ornamental fishes found in an aquarium. 6. Construction of Aquarium.	- Show students materials for constructing aquarium. - Show students types of aquarium (natural & artificial) - Show common ornamental fishes found in an aquarium. - Assist students in constructing aquarium as a class exercise.

FIT 23 – FISHING GEAR AND CRAFT TECHNOGY
(PRACTICAL ONLY)

S/NO	TOPICS/OBJECTIVES	CONTENTS	ACTIVITIES/REMARKS
1.	Classifications of Fishing Gear	1. Identification of all the traditional and modern fishing gear in use in Nigeria. 2. Classification of fishing gears and method under: a. Active fishing gears (trawl, cast net, seine nets, claps nets etc.) b. Passive fishing gears (gile net, trammel nets, traps etc.	- physical identification and sketches.
2.	Netting materials for gear construction.	1. Natural fibers materials for net construction. 2. Synthetic materials for net construction. 3. Physical characteristics of synthetic fibers (flexibility, strength etc.) 4. Identification tests on the various types of synthetic fiber (water and visual tests)	- Physical identification and reports. - Lectures using aids. - Guide students through practical works. - Laboratory Practices and reports.
3.	Basic processes of net construction	1. Definition of terms associated with net construction viz: normal and T-cut, bar cut, combinations cut etc. 2. Processes in net construction, braching, strand formation (rope), tapering, creasing, joining, knotting etc. 3. Mount netting material on support ropes (head and ropes). 4. Explanation on hanging ratio (coefficient) and its effects on shape of net and its application constraints. 5. Construction of mount net using 50% and 60% hanging.	- Guide students on practical works.
4.	Types of fishing craft/boat	1. Description of a typical fishing craft. 2. classification of crafts into calabash; bamboo rafts (aids) canoes, dingy, boats, and trawlers etc. 3. Different types of fishing boat e.g. wooden, glass fiber, steel, ferrocement etc. 4. The difference between mechanized and non-mechanised boats. 5. Simple tools for building boats. 6. Drawing of a simple fishing boat plan. 7. Identifying different boat parts. 8. Designing simple fish boat (model).	- Lecture with aids, models and sketches. - Guide students on practical boat construction.

FIT 31 – INTRODUCTION TO FISH FARM ENGINEERING

(PRACTICAL ONLY)

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	Selection of site for fish farms.	1. Definition of fish farm engineering. 2. Reconnaissance survey of farm site for vegetation, water source/quality, topography etc. 3. Determination of elevation and distance using simple instruments like hand level, kern levels, ranging poles, tape etc. 4. Simple soil suitability testing e.g permeability tests, soil structure, soil PH. 5. Simple water quality test on water source temperature, turbidity, dissolved oxygen, PH, ammonia, iron, lead etc.	- Supervised site survey practicals. - Use kernel level range pole draw graph and use a tape - Conduct practical on soil test with students. - Estimate area of fish farm. - Guide the students on how to determine water quality using water quality. Kit or titration method in the laboratory.
2.	Design of simple fish farm structures.	1. Identification of common structures found in fish farm e.g. pond, sluice gate, wooden tank, fibre glass tank, concrete tank etc. 2. Design of fish farm structures such as: a. Earthen pond e.g. barrage, contour etc. b. Other holding facilities e.g. aquarium tank, concrete tank, horrestead pond, raceway, plastic tank, wood/plank tank, fibre glass tank. 3. Simple outline design of ancillary farm structures e.g. store, net rack, hatchery, counting shed, reservoir etc. 4. Sketch pond dyke core trench.	- Take students out to see some common fish farm structures. - Supervised trip to fish farms and reports. - Practical design. - Give assignment on pond design.
3.	Construction of fish farm facilities	1. Identifying the following devices: dyke (dam), Monk, Dyke Protection devices, Sluice gate, spillway etc. in fish farm facilities. 2. construction of a typical earthen fish pond. 3. Construction of horrestead/Concrete Pond, aquarium, transportation tank. 4. Determination of fish to water surface area requirements for stocking based on size and species. 5. Management of dyke protection devices. 6. Assembling a model earthen pond aquarium tank, hapa/cage, and pen. 7. Setting up other small fish farm holding structures e.g. fiber glass tank, plastic bowl, wood/plank tank etc. 8. Cutting of glasses using diamond	- Carryout installation and set up fish farms with students. - Assign students in groups to construct various models. - Assign student in groups to construct aquarium tanks etc using glass. - Assist student in constructing a pond in the college fish farm. - Each graduating class should add a pond to the college fish farm.

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
		cutter. 9. Taking part in the construction of a standard fish pond earthen or concrete.	
4.	The concept of Hatchery design	1. Description of the various types of hatchery e.g. in-door, out-door. 2. Description of other supporting structures e.g. Nursery pond, spawning tank. 3. Identification of incubator, spawing tank, brood stock tank etc.	- Lecture - Visit hatchery work with students. - Give assignment on model hatchery. - Construct hatchery models with students

FIT 33 – INTRODUCTION TO POST HARVEST TECHNOLOGY AND MARKETING

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
1.	Nutritive value of fish in Diet.	1. The nutritional composition of fish. 2. The importance of fish in human nutrition. 3. other usefulness of fish such as a source of oil.	- Lecture on the nutritional composition of fish.
2.	Fish handling methods	1. Common fish handling equipment: a. aboard b. landing site c. off shore 2. Operation and maintenance of common fish handling equipment. 3. Various handling methods affecting fish quality. 4. The effect of gutting on keeping quality of fish.	- Practicals on handling equipment commonly used by fisher folk. - Conduct practical on the effect of different handling methods on keeping quality of fish and guide students to do so. - Perform gutting of fish in keeping quality of fish.
3.	Causes of fish spoilage.	1. The causes of fish spoilage. 2. Factors responsible for spoilage of fish: a. Bacterial b. Enzymes c. Chemical Oxidation 3. Locations of micro organisms on the fish body. 4. Spoilage microorganisms and their control measures.	- Conduct practical wish students to determine the microbial load in fresh and spoilt fish. - Access report on practical identification of bacterial, enzymes on fish body.
4.	Techniques of evaluation of freshness of fish.	1. Physical properties of freshly caught fish e.g. eyes, gut, gill appearance and flesh. 2. Identifying changes that occur in fish stored at various temperature on the flesh, eyes, gills and general appearance. 3. Signs of deterioration in fish e.g. off colour, off odour, flassiness, taste	- Conduct visual assessment of fishes stored under different environmental conditions e.g. temperatures moisture.

FIT 33 – INTRODUCTION TO POST HARVEST TECHNOLOGY AND MARKETING (PRACTICAL CONTENT)

S/NO	TOPICS	CONTENTS	ACTIVITIES/REMARKS
5.	Methods of fish preservation and processing methods.	1. Description of the various fish processing and preservation methods e.g. boiling, frying, smoking, sun drying, salting, fermentation, canning, freezing, icing. 2. Equipment for each method in 5.1 above. 3. The differences between icing, freezing and cold storage. 4. The advantages and disadvantages of duration of each of the methods in 5.1.	- Conduct practical with students on fish boiling. Frying, smoking sun drying, salting, fermentation, icing, freezing, cold storage and canning. - Design simple smoking kilns, salting vat.
6.	Fish Marketing	1. Forms of fish for marketing. 2. Various outlet for marketing the following: a. fish seed (fungaling) b. Table fish c. Shell fish d. Ornamental fishes etc. 3. Explanation on the constraints associated with fish marketing.	- Lectures.