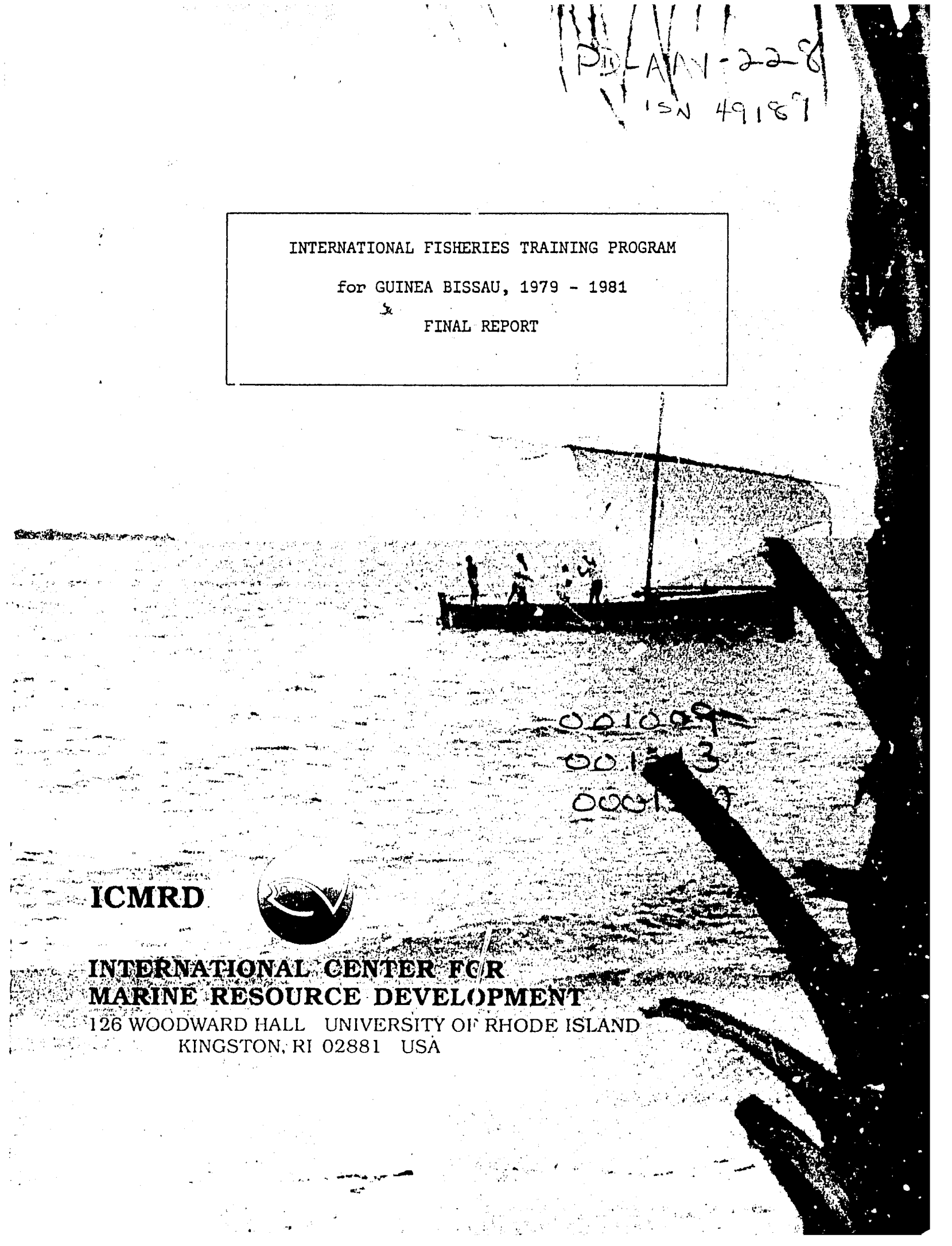
INTERNATIONAL FISHERIES TRAINING PROGRAM

for GUINEA BISSAU, 1979 - 1981

FINAL REPORT



ICMRD

INTERNATIONAL CENTER FOR MARINE RESOURCE DEVELOPMENT
126 WOODWARD HALL UNIVERSITY OF RHODE ISLAND
KINGSTON, RI 02881 USA

INTERNATIONAL FISHERIES TRAINING PROGRAM
GUINEA BISSAU

1979 - 1981

FINAL REPORT

By

Christine D. Mortimer

Funding provided by
US/AID through the
African American Institute

CONTENTS

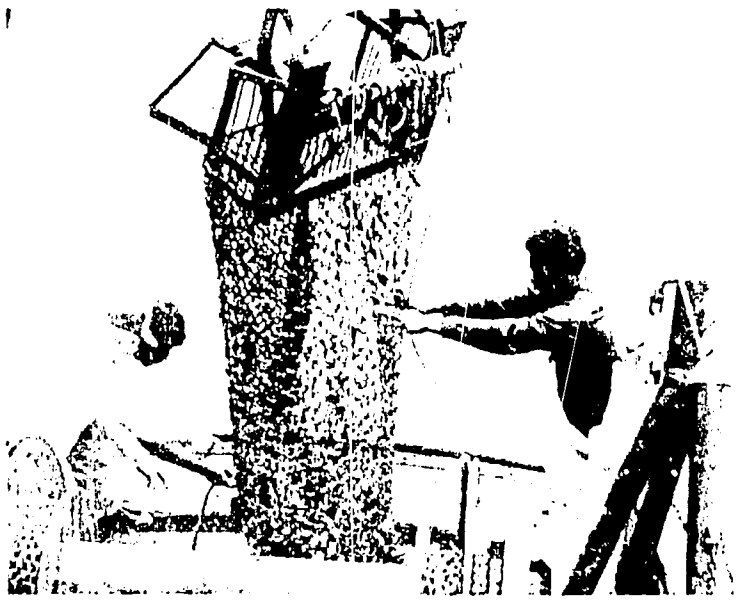
Photographs, opposite page

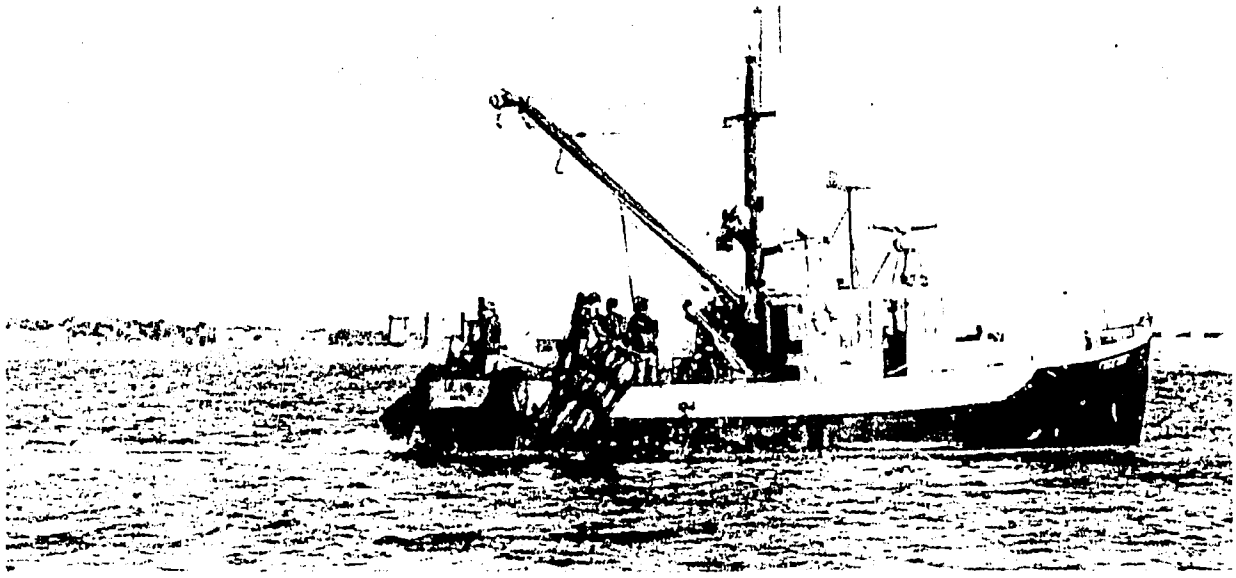
Upper left. In the seamanship laboratory at the Fisheries School, fishing master trainee Eugenio Da Costa reeves a block and tackle.

Middle left. At left, Captain George E. Gamache and Jorge Mouzinho, electrical technician, and at right, Braima Camara, refrigeration technician, brought a clam dredge on board and are releasing the chain link bag to open it onto the deck of the F/V Gail Ann.

Right. Watching at left is Jose V. Rodrigues, fishing master trainee, while fishing gear instructor Timothy C. Visel examines a fyke net.

Bottom. The Fisheries School's F/V Gail Ann bottom trawling.





Photographs, opposite page

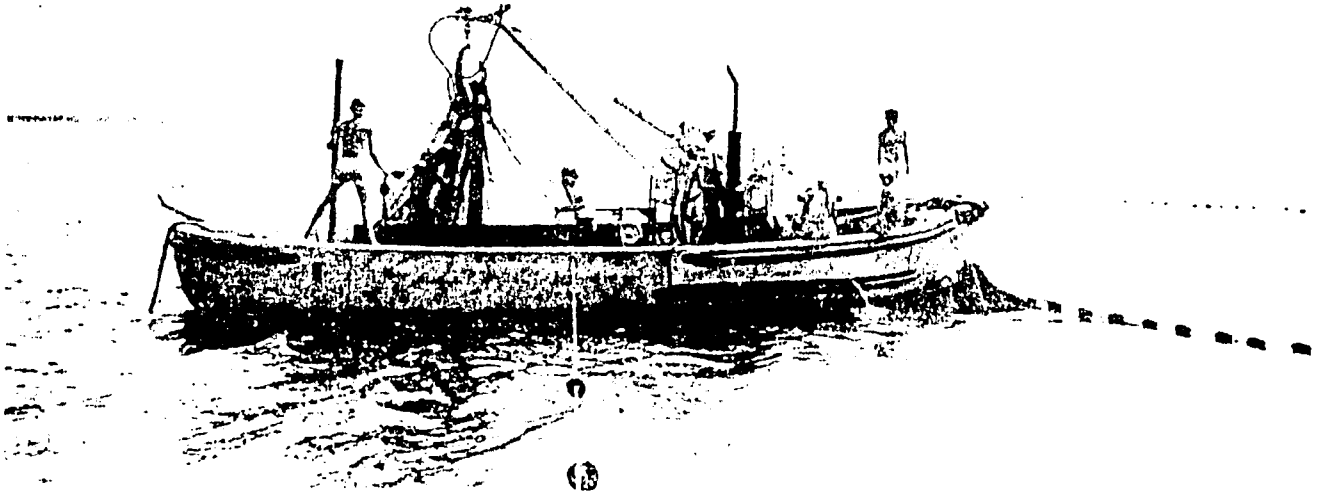
Upper left. In the pilothouse of the F/V Gail Ann, diesel mechanic trainee Luis Barbosa fills out the logbook for a day's fishing.

Upper right. Almame Camara, diesel mechanic trainee, works in the F/V Gail Ann's engine compartment.

Middle left. Eugenio Da Costa, fishing master trainee, and Jorge Mouzinho, electrical technician, cut the free ends of wires after splicing a cable.

Middle right. Wire splicing is a task learned in seamanship class.

Bottom. The F/V Venture, a seine boat, is equipped with block and winch.



INTRODUCTION

The Ministry of Fisheries of the Republic of Guinea Bissau nominated twenty young men to participate in a two and a half year commercial fisheries training program coordinated by the International Center for Marine Resource Development (ICMRD) of the College of Resource Development, University of Rhode Island.

The project was funded by the United States Agency for International Development (A.I.D.) and sponsored by the African American Institute, New York.

The training program commenced in September 1979 with the first group of trainees (11 students). These students had spent the previous year in English language training at Boston University and the English Language Institute in Cambridge, MA. The second group of trainees (9 students) arrived in January 1980 after their English studies of one year at the State University of New York at Buffalo.

This two-year certificate program was devised to provide training to students with varied educational and experiential backgrounds. That is, it had been tailored to meet the needs of students who may not have possessed college entrance requirements. With slight modifications, it could service students with any increment of education. In the specific case of the nominees from Guinea Bissau, it was found that none of the trainees had earned the equivalent of a high school diploma, although several had attained the equivalent of first or second year in high school.

Students were trained in the following specialties:

Fishing Captain
Fishing Master
Diesel Mechanic
Electrical Technician
Electronics Technician
Refrigeration Technician.

All students participated in a common fisheries curriculum during the first year, then focused upon their respective specialty during the latter part of the program. The electrical, electronics, and refrigeration technician-trainees received their specialized training at the New England Institute of Technology, Providence, RI.

The project was designed to meet the needs of developing countries for trained technical manpower to promote commercial fisheries development. It required persons possessing the practical skills as well as the technical background to operate fishing vessels and provide support functions necessary to maintain the fishing industry.

PROJECT PERSONNEL

Personnel

Gerald A. Donovan - Dean, College of Resource Development, University of Rhode Island
Director, International Center for Marine Resource Development (ICMRD)

John C. Sainsbury - Director, International Fisheries Training Program - Guinea Bissau
Professor, Department of Fisheries and Marine Technology

Christine D. Mortimer - Program Coordinator, International Fisheries Training Program - Guinea Bissau
Instructor, Department of Fisheries and Marine Technology

Instructors

George C. Gamache
Jeffrey H. Kaelin
Bruce T. Mortimer
Robin Sainsbury
Timothy C. Visel
David J. Ward
Anna Xavier

Graduate Assistants

Frances LeNardo
Brian Maxwell
Thomas Omara-Alwala

Support Personnel

Yolande Zahler - Program Officer - DTPSA, African American Institute

Donald E. McCreight - Assistant Director, ICMRD

Adore H. Cloutier - Fiscal Coordinator, ICMRD

David W. Whelan - Business Manager, College of Resource Development

Pamela Barker - Fiscal Clerk, College of Resource Development

Carol DeMello - Secretary, Department of Fisheries and Marine Technology

Mamie Chen - Final Report Typist

GUINEA BISSAU FISHERIES TRAINEES

Group I	Specialty	
Abilio Bacai	Fishing Master	Commercial Fisheries Certificate June 1981
Jose Aliu Balde	Diesel Mechanic	Letter of Completion*
Antonio Cabral, Jr.	Electronics Technician	Dismissed, Spring 1980
Abubacar Conte	Diesel Mechanic	Certificate June 1981
Laurentino Pedro Gomes	Electrical Technician	Dismissed, Spring 1980
Agostinho Antonio Mendes	Fishing Master	Certificate June 1981
Cesar Nosolini	Diesel Mechanic	Certificate June 1981
Paulo Lobo de Pina	Diesel Mechanic	Certificate June 1981
Jose Maria Rodrigues	Fishing Captain	Certificate June 1981
Luis Alberto Vieira	Fishing Captain	Certificate June 1981
Group II		
Luis Medeiros Barbosa	Diesel Mechanic	Certificate December 1981
Almame Sene Camara	Diesel Mechanic	Certificate December 1981
Braima Camara	Refrigeration Technician	Certificate December 1981
Eugenio Da Costa	Fishing Master	Certificate December 1981
Carlos Alberto Garcia	Electrical Technician	Dismissed, Spring 1980
Jorge Silvano Gomes	Refrigeration Technician	Certificate December 1981
Jorge Candido Mouzinho	Electrical Technician	Dismissed, October 1981
Henrique Monteiro Ribeiro	Electronics Technician	Dismissed, October 1981
Jose Valdemiro Rodrigues	Fishing Master	Certificate December 1981

* Trainee received Letter of Completion in lieu of Certificate due to poor performance in the program.

ADVISORY COMMITTEE

The following committee members were appointed by Dean Gerald A. Donovan to serve on the program advisory committee.

John C. Sainsbury, Chairman, Director, Guinea Bissau Fisheries Training Program

Yolande Zahler, Program Director, DTPSA, African American Institute

Phillip Logan, Acting Assistant Director, ICMRD

Christine D. Mortimer, Program Coordinator, Guinea Bissau Fisheries Training Program

Albert Owens, Dean of Residence Instruction, College of Resource Development

David Whelan, Business Manager, College of Resource Development

Melvin K. Hendrix, Director, Black Studies Program

Donald E. McCreight, Chairman, Resource Development Education; 1981 - Assistant Director, ICMRD

The fisheries program designed for trainees from overseas presented several unique aspects in contrast to the university's two-year fisheries program. Meetings were conducted each semester in which program directives were examined, curriculum reviewed, and budgetary matters discussed. In addition, each trainee's performance was reviewed inclusive of grades, attendance, and attitude.

Important considerations involved curriculum revisions to accommodate trainee capabilities, recommendations regarding alternative specialties for trainees better suited for non-technical programs, description of duties for each trainee to qualify in their chosen field, and qualifications necessary to complete certificate requirements. But perhaps the most significant contribution was the sharing of information on Guinea Bissau cultural facets which benefited all those involved in the program.

THE DEPARTMENT OF FISHERIES AND MARINE TECHNOLOGY

The International Fisheries Training Program was patterned to a large extent after the program offered at the Department of Fisheries and Marine Technology, College of Resource Development at the University of Rhode Island. Originated in 1967, the program consists of a two-year Associate Degree or four-year Bachelor's Degree in Commercial Fisheries. Additionally, the department also participated in fisheries training for NOAA officers, graduate courses, and a two-year certificate program for international students in conjunction with the International Center for Marine Resource Development (ICMRD).

The Department of Fisheries and Marine Technology possesses excellent personnel and facilities for fisheries training. Students learn seamanship, fishing gear, twine skills and engineering in well-equipped classrooms and laboratories. Other courses such as navigation, marine electronics, fish preservation and meterology round out an intensive and practical curriculum.

In addition to the above, the fisheries department has fishing vessels. Students benefit from experience aboard a dragger (F/V Gail Ann) equipped for bottom, midwater, dredging or shrimp trawling; and a seine boat (F/V Venture) used for purse seining. The international program has contributed a skiff used for small-scale (artisanal) fishing employing skiff and cast nets, long-lines, fish and lobster traps and gill nets.

The successful experience of the Department of Fisheries and Marine Technology has had an immense impact on the development and implementation of the international project.

PROJECT OBJECTIVES

The objective of this program was to educate trainee candidates from Guinea Bissau, Africa in the various aspects of commercial fisheries. The ultimate goal was to prepare trainees to take an active part in the developing fisheries of their country by possessing the practical skills as well as the technical background to operate fishing vessels and provide support functions necessary to maintain the fishing industry.

Each student chose a specialty before coming to the United States in one of the following areas: fishing captain, fishing master, diesel mechanic, refrigeration technician, electronics technician, electrician. All trainees received a well-rounded commercial fisheries education in subjects including fishing gear, vessel operations, vessel engineering, fisheries economics, and seamanship, to name a few. Trainees concentrated in their specialty areas during the second year. Additionally, technical courses in refrigeration, electronics, and electricity were provided for those trainees destined for technical occupations. A "hands-on," practical approach was stressed and is reflected in the content of the coursework.

A key aspect of this program is that regardless of the specialty to be focused upon, all trainees received a common education in the basics of commercial fisheries. It is thought that in order for a trainee to someday be a responsible member of vessels' crew or to effectively participate in a shoreside support function, he must have a good understanding of the tasks involved. We believe that in complying with the above concept, we prepared the trainees to participate effectively in the development and maintenance of the fishing industry in their homeland.

The curriculum was for the most part flexible. It was constantly reviewed and when necessary, revised to meet the capabilities of the trainees. Likewise, the trainees were reviewed for their progress. Any student needing additional help in grasping a subject or task was given individual instruction. A trainee who was eager to learn more was encouraged and given advanced projects to work on. Although it meant a greater commitment by the staff, every effort was made to treat each trainee as an individual with unique capabilities and needs.

The advisory committee meetings were especially useful in reviewing all our participants and their progress. It proved advantageous to utilize the collective ideas and opinions of the committee in recommending specific avenues of learning for each student.

LANGUAGE TRAINING

All trainees received one year of English language training prior to attending the program. Group I, which arrived in the United States first, received training at Boston University and the Intensive Language Institute, Cambridge, MA. Group II received training at the University of New York at Buffalo.

Proficiency in English ranged from very good to very poor. Interviews were conducted by the Program Coordinator to determine the extent of proficiency. As a result, it was deemed necessary to conduct an English class three hours per week to reinforce and introduce fisheries terminology to the students. Students were evaluated during the course and those whose capabilities were considered acceptable to overall understanding of the program subjects were excused. Those who were judged to need more practice were required to continue.

DESCRIPTION OF GRADING SYSTEM

Content Numeral

The Content Numeral is the number assigned to a course indicating the amount of time expended in that course. The Content Numerals for each course are added together to give the Total Content Numeral.

Grade

The grading regime is the system in practice at the University of Rhode Island. It is based upon 100 percent and is as follows:

A = 90 - 100% Superior
B = 80 - 89% Good
C = 70 - 79% Average
D = 60 - 69% Passing
F = 50 - 59% Failure.

In some cases trainees were required to reach a certain standard in order to pass a course. First Aid is an example where trainees were required to qualify for the Standard Red Cross certificate. A letter grade is not applicable since a student either "passes" or "fails." A Pass or Fail grade was given, the required score varying from one course to another. No points were awarded and the courses were not included in computing the Grade Point Average.

Points

Each letter grade is awarded a corresponding number of points as shown below:

A = 4 points
B = 3 points
C = 2 points
D = 1 point
F = 0 points.

The total number of points earned for each course is given by the Content Numeral multiplied by the points awarded for the letter grade. For example, for a course having a Content Numeral of 4 and which a grade of B (worth 3 points) is awarded, the total points earned for that course are 12.

Attendance

Attendance in the program was mandatory for all courses and for all trainees unless otherwise indicated. All trainees were allowed three unexcused absences for each course in the program. Attendance on the proficiency sheet is shown as a percentage of the total class time. For example, an attendance score of 90% for a course indicates that the student attended class 90% of the time. Sometimes attendance is shown as Satisfactory (S) or Unsatisfactory (U).

Approximate Portuguese Standard

An effort was made to show an approximate grade in the point system used in the Portuguese school system. The method of grading is as follows:

A = 18 - 20 points
B = 14 - 17 points
C = 10 - 13 points
D = 3 - 9 points
F = 0 - 2 points.

It must be noted that an exact equivalence between the Portuguese and American systems is difficult and for this reason the program adhered to the American system.

The Grade Point Average

The Grade Point Average is a measure of the student's total performance in the program for the period and in the program to date. It is computed by dividing the Total Points Earned by the Total Content Numeral. For example, if the Total Points Earned equals 60 and the Total Content Numeral equals 15, then the Grade Point Average is 60/15 or 4.0.

The scale for Grade Point Average is as follows:

A = 4.0
B = 3.0
C = 2.0
D = 1.0
F = below 1.0.

Award of Certificate

In order to qualify for the award of a certificate upon completion of the program, it was necessary for a trainee to meet the following requirements:

(1) Obtain a grade of at least D or "Pass" for all courses in his program of studies.

(2) Obtain a minimum Grade Point Average of 2.0 for the entire program of studies. Note that the Pass/Fail grades are ignored in computing the Grade Point Average.

Although a grade of D may be considered passing in an individual course, it was necessary for a minimum average grade of C to be maintained throughout the program.

Academic Probation

A trainee was placed on Academic Probation if his Grade Point Average fell below 1.0 at the end of the first semester and below 2.0 at the end of a later semester.

Trainees on probation were required to regain a 2.0 average by the end of that semester. Failure to achieve might result in Academic Dismissal.

Grade reports were issued at the end of every semester. In some cases, mid-semester evaluations were conducted to map the progress of trainees.

See Grade Report Sheet on the following page.

Grade Report Sheet

UNIVERSITY OF RHODE ISLAND

International Fisheries Training Program - Guinea Bissau

SUMMARY OF TRAINEE PERFORMANCE

Name: _____ DATE: _____

Period: _____

Subject	Content Numeral	Grade	Points	Attendance	Portuguese Standard
Totals					

During This Period:

	Points
1. Total Content Attempted 2. Total Content Completed Satisfactorily 3. Total Points Earned	
4. Grade/Point Average (3/1)	

Program To Date:

1. Total Content Attempted 2. Total Content Completed Satisfactorily 3. Total Points Earned	
Grade/Point Average (3/1)	

NOTES: _____

_____

_____
Program Coordinator

_____
Program Director

A Cooperative Program of the International Center for Marine Resource Development and the Department of Fisheries and Marine Technology

PROFICIENCY REPORT

INTERNATIONAL FISHERIES TRAINING PROGRAM

GUINEA BISSAU

NAME: _____ DATE: _____

Fishing Gear I

Lecture

Quiz #1	_____
Quiz #2	_____
Quiz #3	_____
Quiz Average	_____
Notebook	
Inspection #1	_____
Inspection #2	_____
Test	
#1	_____
#2	_____
Final Exam	_____

Laboratory

Quiz #1	_____
Quiz #2	_____
Quiz #3	_____
Quiz Average	_____
Projects	
#1 (Hammock)	_____
#2 (Diamond)	_____
#3 (Back Funnel)	_____
#4 (Small Funnel)	_____
#5 (Large Diamond)	_____
Project Average	_____
Laboratory Notebook	
Inspection #1	_____
Inspection #2	_____
Inspection #3	_____
Inspection #4	_____
Notebook Average	_____

Laboratory

Twine Mending Test #1	_____
#2	_____
#3	_____
#4	_____
Twine Mending Average	_____
Twine Practical #1	_____
#2	_____
#3	_____
Final Twine Practical #4	_____
Final Twine Practical Average	_____
Final Exam (written)	_____
Attendance:	_____
Final Grade:	_____

Seamanship

Lecture

Quiz #1 _____
Quiz #2 _____
Quiz #3 _____
Quiz #4 _____
Quiz #5 _____
Quiz #6 _____
Quiz #7 _____

Test
#1 _____
#2 _____

Final Exam _____

Laboratory

Hard Eye Splice _____
Cut Splice _____
Notebook Inspection #1 _____
#2 _____
#3 _____

Test #1 _____
#2 _____
#3 _____
#4 _____

Final Exam _____

Attendance: _____

Final Grade: _____

Fishery Mathematics

		Not Collected
Homework	#1-#5	
	#6	_____
	#7	_____
	#8	_____
	#9	_____
	#10	_____
	#11	_____
	#12	_____
Quiz	#1	_____
	#2	_____
	#3	_____
	#4	_____
	#5	_____
	#6	_____
Test	#1	_____
	#2	_____

Pre Final Exam _____

Final Exam _____

Attendance: _____

Final Grade: _____

Extra Math Lab Attendance: _____

Vessel Operations

Midterm Exam (not counted) _____

Final Exam (written) _____

Final Exam (practical) _____

Assessment _____

Attendance: _____

Final Grade: _____

Technical Drawing

Homework #1 _____

#2 _____

Quiz #1 _____

#2 _____

#3 _____

Attendance: _____

Final Grade: _____

First Aid

Final Exam _____

Attendance: _____

Final Grade: _____

English

Homework _____

Dictations _____

Attendance: _____

Comprehensive Exam: _____

STANDING ORDERS
WITH RESPECT TO VESSELS OF
DEPARTMENT OF FISHERIES AND MARINE TECHNOLOGY

All the Standing Orders given herein are to be read by each student so that he may be thoroughly familiar with his responsibilities as crew member in vessels of this Department and so that these vessels may be operated in a safe and seamanlike manner. Each student shall complete and sign the attached receipt for these Standing Orders and return it to the issuing authority.

1. Keep the vessel clean and orderly. Carry out your own clean-up assignments thoroughly and help others with theirs whenever possible. Keep all tools, equipment, and stores stowed in their proper locations. Report any missing or depleted items. Whenever you find anything adrift, stow it away properly.

2. Keep all machinery and equipment in good, safe working order. Carry out your own inspection and maintenance assignments thoroughly and help others with theirs whenever possible. Whenever you find anything wrong, correct it where possible and, if the condition persists report it. If in doubt whatsoever, check it with the instructor.

3. Strict compliance with the International Regulations for Preventing Collisions at Sea or the Inland Rules and Pilot Rules—whichever may apply—is required by law. It is understood that initially you may not be thoroughly familiar with the rules. However, your compliance with the Look-Out Rule will avert most dangers of navigation and collision:

   > Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

4. Your full compliance with these Standing Orders as well as any other directives which may be in effect concerning vessels of this Department will avert most risk of danger to the safety of life and property. However, under no circumstances shall anything contained in these Standing Orders or any other directives which may be in effect take precedence over any order given by the instructor in charge.

I, _____, have read and understand the Standing Orders with Respect to Vessels of the Department of Fisheries and Marine Technology dated 24 September 1979.

_____ (Signature in full)

_____ (date of signature)

PROGRAM OF COURSES

First Semester	Credits	Hours/ Week
Introduction to Commercial Fisheries (Lecture)	2	2
Fishing Gear I (Lecture and Laboratory)	4	8
Seamanship I (Lect. and Lab.)	4	8
Mathematics I (Lect.)	3	3
Vessel Operations (Fishing)	3	3
English Seminar (Lect.)	1	3
First Aid (American Red Cross)	non-credit	6
Total	17	33
Second Semester		
Fishing Gear II (Lect. and Lab.)	3	3
Seamanship II (Lect. and Lab.)	4	3
Mathematics II (Lect.)	3	3
Vessel Operations (Fishing)	3	3
Technical Drawing (Lab.)	2	4
English Seminar (Lect.)	1	3
Total	16	19
Summer Session		
Fishing Gear III (Lect. and Lab.)	3	6
Vessel Operations (Fishing)	2	3
Outboard Motor Mechanics (Lect. and Lab.)	5	4.5
Total	10	13.5
Third Semester		
Fishing Gear IV (Lect. and Lab.)	4	6
Vessel Operations (Fishing)	3	3
Marine Engineering I (Lect. and Lab.)	4	5
Navigation I (Lect. and Lab.)	3	3
Fisheries Economics (Lect.)	2	2
Fishery Meteorology (Lect.)	2	2
Total	18	21
Fourth Semester		
Fishing Gear V (Lab., Fishing Captains, Fishing Masters)	5	12
Marine Engineering II - Diesel (Lab., Diesel Mechanics)	5	12
Navigation II (Lect. and Lab.)	3	1.5
Technical Science (Lect. and Lab.)	3	3
Vessel Operations (Fishing)	3	3
Fish Handling and Preservation (Lect. and Lab.)	3	2
Total	22	33.5
Each Trainee	17	

	Total Credits
Fishing Captains	78
Fishing Masters	78
Diesel Mechanics	78

Technical Courses (New England Technical Institute of Technology)

All technical trainees participate in Semester I, II and Summer Session of commercial fisheries program before attending technical school.

Refrigeration		Credits	Hours/ Week
Quarter I			
Basic Refrigeration		8	8
Basic Refrigeration Lab		4	8
Introduction to College Math		4	4
	Total	16	20
Quarter II			
Basic Refrigeration Electricity		8	8
Basic Refrigeration Electricity Lab		4	8
Technical Math		4	4
	Total	16	20
Quarter III			
Commercial Refrigeration		8	8
Commercial Refrigeration Lab		4	8
Basic Physics		4	4
Fishing Handling and Preservation (Dept. Fisheries, URI)		3	2
	Total	19	22
Quarter IV			
Air Conditioning		8	8
Air Conditioning Lab		4	8
	Total	12	16
Quarter V			
Basic Heating		8	8
Basic Heating Lab		4	8
Ship Systems (Dept. Fisheries, URI)		4	2
	Total	16	18

Electronics Technology			
Quarter I			
Basic Electronics		8	8
Basic Electronics Lab		4	8
Introduction to College Math		4	4
	Total	16	20
Quarter II			
Basic Circuits		8	8
Basic Circuits Lab		4	8
Technical Math		4	4
	Total	16	20
Quarter III			
Advanced Circuits		8	8
Advanced Circuits Lab		4	8
Basic Physics		4	4
	Total	16	20

		Credits	Hours/ Week
Quarter IV			
Special Circuitry		8	8
Special Circuitry Lab		4	8
	Total	12	16
Quarter V			
Digital Logic		8	8
Digital Logic Lab		4	8
Ship Systems - Marine Electronics (Dept. Fisheries, URI)		4	2
	Total	16	18

Electrical Technology

Quarter I			
Fundamental Electricity		8	8
Fundamental Electricity Lab		4	8
Introduction to College Math		4	4
	Total	16	20
Quarter II			
Alternating Current		8	8
Residential Wiring Lab		4	8
Technical Math		4	4
	Total	16	20
Quarter III			
Advanced AC Theory		8	8
Advanced AC Circuits		4	8
Basic Physics		4	4
	Total	16	20
Quarter IV			
Polyphase Systems		8	8
Polyphase Systems Lab		4	8
	Total	12	16
Quarter V			
Motors and Controls		8	8
Motors and Controls Lab		4	8
Ship Systems - Electrical (Dept. Fisheries, URI)		4	2
	Total	16	18

	Total Credits
Refrigeration Technician	122
Electronics Technician	119
Electrical Technician	119

COURSE LISTINGS

Introduction to Commercial Fisheries - T. C. Visel
(Lect., 2 credits, 2 hours/week, all trainees)

Objectives: Introductory course encompassing oceanography, biology of commercial species, world fisheries, and fishery management.

Subjects/Activities:

Lecture:
- Oceanography in relation to world fisheries
- Fish producing regions and important world fisheries
- Structure of the earth, composition of core, mantle, asthenosphere and lithosphere
- Sea floor spreading and plate tectonics, detailed explanation of continental plates, sea floor spreading, mountain building, volcanism, introduction to the Mid-Atlantic Ridge
- Atlantic Ridge and continental shelfs
- Water cycle, circulating ground water, chemistry of ocean water, precipitation, evaporation, transpiration, and latent heat of fusion
- Composition of seawater and its properties, haloclines and thermoclines and their importance to fishing
- The Coriolis effect and wind driven circulation of the oceans. Ocean Circulation handout
- World fisheries industrial and fresh fish production. Large scale capital and labor intensive fisheries. Small scale, substance and artisanal fisheries, distant water fleets, factory vessels
- Food and Agriculture Organization of the United Nations (FAO) Yearbook of fishery statistics. International standard statistical classification of Aquatic Animals and Plants
- Fishery management, introduction to population dynamics, natural and fishing mortalities, growth rates, yield per recruit, fishing effort, Maximum Sustainable Yield (M.S.Y.), Optimum Sustainable Yield (O.S.Y.)
- Fishery management, year class production and sustainable yield curves
- Managing fisheries, problems of overfishing, climatic changes, yearclass failure, increased natural production, diseases and pollution
- Managing fisheries - fishing effort, quotas and seasons, larger mesh size in nets, fishery closures.

Fishing Gear I - T. C. Visel
(Lect., lab., 4 credits, 8 hours/week, all trainees)

Objectives: Introductory course focusing on fisheries, fishery methodology, the tools of the trade and fundamental skills.

Subjects/Activities:

Lecture: Oceanography. Continental shelf and fishing grounds. Tides and water movement. Upwellings and coastal currents. Productive fishing areas. Phytoplankton and introduction to ocean food chain. Productivity of coastal areas versus open ocean.

World fish production. Overview of world's most productive areas and most productive countries. Reasons for fishing including choice of fishing methods and gear. World fish catch statistics.

Lobstering. Commercial aspects of lobster industry in the U.S., including an introduction to the biology of the American Lobster, explanations of lobster gear and vessels, lobster pot designs and various fishing techniques.

Introduction to trawl nets. Different types of gear and the reasons for differences, otter trawl.

Trawl net. The development of early trawls and reasons for changes. Different trawl net designs including the early beam trawl, flat nets, balloon trawls, yankee nets, and the URI high rise net.

Introduction to early fishing vessels. The development of the modern diesel trawler. Side trawler deck layout and explanations. Stern trawler deck layout and explanations.

Introduction to the Dan Leno arrangements and trawl doors. Trawl door construction, angle of attach and proper towing point. Trawl net legs (top leg wire rope, bottom leg chain).

Methods. Trawl net parts and definitions (headrope, footrope, sweep, gores, and up and down lines. Introduction to midwater trawling. Dan Leno - trawl door handout.

Lab: Introduction to twine materials - scales, needles and twine

First project. The construction of a hammock - 1st method of making mesh (webbing) - a row of meshes.

Hammock plan

Second project. The construction of a webbing square or a diamond, batings and creasings (western method) or adding and subtracting the number of meshes in a row without cutting. Diamond plan.

Third project. Large back funnel, first introduction to second method of making mesh (a chain of meshes) and conversion of knots to meshes and meshes to knots, back funnel plan.

Fishing Gear I (continued)

Lab: Fishing gear terminology. Complete explanations of fishing gear terms including descriptions of different trawl nets and sections of nets.
Twine sizes and types. Braided and twisted nylon polypropylene, polyethylene. Twine thread counts and size determination.
Introduction to monofilament netting
Lobster pot design and construction. Trapezoidal round and rectangular designs.
Fifth project. Small front funnel, front funnel handout.
Introduction to twine mending. Hillier method 1-5. Cross twine and run of the twine, siders and pickups.
Lecture cutting and trimming holes. Hillier method.
Second diamond project. 20 meshes across at corners.
Lobster pot funnels assigned. Two front funnels, two strand white nylon one back funnel, three strand double tarred twine. Lobster pot funnel handout.
Sixth project. The construction of an inshore lobster pot 36"x12"x24" - trapezoidal design. Before construction of the lobster pot could start, each student had to complete the two small funnels and one back funnel needed for the actual construction of the pot.
The panel cast net design. Construction and layout
Introduction to tapering. The URI tapering formula and calculations - several examples
Joining net sections together. Sidering and sewing
The skirt cast net. Block plan and cutting plan
Seventh project. The panel and skirt cast nets.

Seamanship I - D. J. Ward
(Lect., lab., 4 credits, 8 hours/week, all trainees)

Objectives: Introduction to practical seamanship, deck work, safety radio procedures, and fire fighting.

Subjects/Activities:

Lecture: Line handling orders (leaving and arriving at dock)
Helm orders, engine orders, directions
Classes of fire, hazardous conditions
Points of the compass, cardinal and intercardinal, relative bearings
Ignition temperature, flash point, spontaneous combustion, fire fighting
Hazardous conditions, strategies for fire fighting, water stream and fog
Extinguishing methods - water, fog, CO_2, foam
Eight line handling orders, leaving the dock, vessel maneuvering, turning short around, berthing lines
Logbook notation
Radio communication theory, radio waves, frequency, wavelength, types of radio communication
Modulation, frequency and amplitude, distress frequencies
VHF-FM, MF-AM, SSB, CW
Radio communication procedure, call signs, how to use the VHF-FM radio
Radio testing procedure, common words and phrases
Emergency calls - Mayday, Pan, Security
Automatic alarm signals, sending a distress call, acknowledging a distress call
Relaying a distress call, the international code of signals - Interco, radio telegraphy transmissions
International signal flags
Internationally recognized distress signals
Man overboard procedure, Williamson turn.

Lab: Rope construction, types of rope fiber, parts of a rope, coiling a rope, hand and soft laid rope
Reef knot, figure 8 knot, bowline, bowline and bight (double bowline) sheetbend, double sheetbend, clove hitch, slip knot, round turn and 2½ hitches, ½ hitch, ¼ reef knot, carrick bend, double carrick bend, cod end knot, surgeons knot, timber hitch, anchor bend, fisherman's knot, sheepshank, american sheepshank, running bowline, rolling hitch, barrel hitch, marline spike hitch, diamond carrick bend, noose-type cod end knot, scaffold hitch, catspaw, blackwall hitch, double blackwall hitch, shorten sling
Bosun's chair
Joining a knot
Common whipping, west country whipping, sailmakers whipping

Seamanship I (continued)

Lab: Cut splice, tapered back splice, short splice, tapered short splice, soft eye splice, tapered and dogged soft eye splice, tapered hard eye splice, tapered and dogged short splice
Boxing the compass, relative bearings, line handling, line handling orders, belaying to a cleat
Fair and four leads
Fire fighting equipment, portable fire extinguishers, combination nozzle, foam applicator, L.V. fog applicator.

Mathematics I - D. J. Ward
(Lect., 3 credits, 3 hours/week, all trainees)

Objectives: Review of basic mathematical principles and applied skills.

Subjects/Activities:

Lecture: Introduction
Purpose of mathematics and its relationship to commercial fishing, navigation, engineering, etc.
Fractions, square roots
Line circumference and diameter calculations
Converting fractions to decimals
Addition-subtraction of fractions
Signed numbers, grouping, parenthesis
Laws of multiplication and division
Pythagoren theorem
Area of rectangle, triangle, circle
Metric and English system of measurement
Diameter and circumference
Multiplication and division of signed numbers
Algebra equation solving
Real number system
Combining terms, cancelling terms, multiplying parenthesis
Transposing simple equations, solving linear equations
Geometry, parallel lines, angles in a triangle
Solving simple linear equations, factoring out, simultaneous equations
Areas, diameters, circumferences, equation solving
Pythagorean theorem, areas and diameters
Equation solving, common factors and terms, simultaneous equations
Differences of 2 squares
Improper fractions
Factoring and simultaneous equation solving
Introduction to exponents
Laws of exponents, fractional exponents, negative exponents
Scientific notation.

Vessel Operations I (Fishing) - G. Gamache, J. C. Sainsbury
(Lab., 3 credits, 3 hours/week, all trainees)

Objectives: Introduction to fishing methods and vessel operation aboard the F/V Gail Ann and R./V Squintas.

Subjects/Activities:

Lab: Introduction to the boat
Deck nomenclature
Exercise in steering toward a point of land
Engine terminology
Checklist for engine start-up
Man overboard drill using a flag buoy
Directions for keeping the log, abbreviations for the log-book
The Beaufort Scale
Checklist for engine start-up
Steering a compass course
Engine and helm orders
Steer compass course
Set and haul net
Log nomenclature
Safety checks
Line handling
Station bill, clean-up regime on the boat
Interior pilot house nomenclature
Practice docking with R./V Squintas, berthing in Squintas
Compass steering
Quarter rope fishing, lobster pot fishing
Radar and radio exercises, introduction to Decca Radar
Man overboard drill
Boat handling and docking.

English Seminar (2 seminars) - A. Xavier
(Lect., 1 credit, 3 hours/week, all trainees)

Objectives: To reinforce English language training previously learned and focus upon fisheries terminology.

Subjects/Activities:

Lecture: Practice in conversational English
Definitions of English terms, utilizing the dictionary
Define and translate English words to Portuguese, Portuguese to English
Dictations - practice writing English sentences from a dictated selection
Comprehensive exercises - reading selections with questions to answer in complete English sentences
Note taking in English - use of outline format.

First Aid (American Red Cross)
(Lect., non-credit, 6 hours/week, all trainees)

Objectives: To become familiar with symptoms and emergency treatment of various types of trauma.

Subjects/Activities:

Lecture: Standard first aid course
Diagnosing the unconscious patient
Types of wounds - control of bleeding
Treatment for shock
Bandaging
Classification and treatment of burns
Orthopedic emergencies, immobilization, bandaging
Transportation of the injured
Emergency aid for poisoning
Choking emergencies
Cold and heat exposure
Introduction to cardiopulmonary resuscitation (CPR).

Fishing Gear II - T. C. Visel
(Lect., lab., 3 credits, 3 hours/week, all trainees)

Objectives: Introduction to seining, diversification of fishing equipment; small boat fisheries.

Subjects/Activities:

Lecture: Introduction to purse seines and seining equipment
Midwater trawling
Vessel types and deck arrangements for fisheries including gill nets, longlines, and fish traps
Tapering problems and graduated bellies
Fishing procedures for major worldwide fisheries
Emphasis on equipment and rigging vessels for alternate fisheries (combination vessels)
Static gear for lobstering and pot fishing
Deployment of gear and advantages of certain gear types in coastal areas.

Lab: Trawl net construction and design
Tapering
Webbing square formulas
Cutting and block plan construction procedures
Cast nets, both skirt and tapered designs
Introduction to gill nets
Review mending and patching
Lobster pot construction and design
Knitting lobster pot funnels (front and back).

Seamanship II - D. J. Ward
(Lect., lab., 4 credits, 3 hours/week, all trainees)

Objectives: Rules of the Road (U.S.C.G.)

Subjects/Activities:

Lecture: Distress signals, application of International Rules for preventing collisions at sea
Rule of good seamanship, general prudential rule
Power driven vessel, sailing vessel, vessels engaged in fishing, vessels not under command, vessels restricted in their ability to maneuver, vessels constrained by their draft, and definitions
Meaning of the terms, "Underway," "In right of one another," "Restricted visibility," as defined by the 1970 Colregs
Requirements of a proper lookout, considerations to be taken into account when using radar to navigate, considerations to be taken into account when determining a vessel's speed
Determination of risk of collision
Lights shown by vessels not under command, vessels restricted in their ability to maneuver, vessels constrained by their draft
Head on, overtaking, and crossing situations
Action to avoid a collision, vessels maneuvering required by the Rules, burdened and give-way vessels
Navigating in a narrow channel, navigating in a traffic separation scheme
Dayshapes required by the Rules
Sound signals to be given when navigation in restricted visibility.

Lab: Review of basic knots; Blackwall Hitch, Catspaw, Sheepshank, American Sheepshank, Rolling Hitch, Barrell Hitch, Marlinspike Hitch, Diamond Carrick Bend, Cod End Knots
Radio communication theory and practice, radio check procedure, sending and acknowledging a distress call
Rigging a stage and bosun's chair
Palm and needle whipping, mooring a hook, German seizing, common seizing, and racking seizing
Introduction to blocks, tackles, and purchases, single whip, gun tackle, luff tackle, reeving tackles to advantage and disadvantage, velocity ratio
Breaking strengths of fiber rope, safe of fiber rope, safe working load of fiber rope, care and construction of fiber rope, choice of rope for specific jobs
Reeving blocks and tackles, Gyn tackle, double purchase, three-fold purchase, luff on luff, calculation of size of rope needed to raise a certain load
Care and construction of wire rope, breaking strength and safe working load of wire rope

Seamanship II (continued)

Lab: Roebling soft eye splice in wire rope
Fisherman's soft eye splice in wire rope
Locking tuck soft eye splice in wire rope
Roebline hard eye splice in wire rope
Fisherman's hard eye splice in wire rope
Locking tuck hard eye splice in wire rope.

Mathematics II - D. J. Ward
(Lect., 3 credits, 3 hours/week, all trainees)

Objectives: Continuation of Mathematics I, utilizing basic skills and employment of higher level mathematics.

Subjects/Activities:

Lecture: Review of general mathematics and arithmetic operations, Pythagorean theorem, equation solving
Exponents, scientific notation
Areas: surface areas, volume of cone, sphere, pyramid, cylinder
Quadratics equation solving, factoring, quadratic formula, completing the square
Logarithms, interpolations
Multiplying, dividing, finding square roots with logarithms
Introduction to functions, graphs of linear functions, various types of graphical representation
Graphs of quadratic functions, 3-dimensional graphical representation
Introduction to trigonometry, sine, cosine, tangent formulas
Solving triangle problems using the trigonometric functions, versine and haversine formulas
Solving oblique plane triangles using the trigonometric identities
Law of sines, cosines.

Vessel Operations II (Fishing) - G. Gamache
(Lab., 3 credits, 3 hours/week, all trainees)

Objectives: Practice in vessel maneuvering and fishing operations aboard a trawler and seine boat.

Subjects/Activities:

Lab: Boat handling, docking
Station bill
Logbook
Emergency procedures
Bottom, midwater trawl
Purse seining
Pot fishing
Practical navigation procedures
Electronic navigation aids.

Technical Drawing - R. Sainsbury
(Lab., 2 credits, 4 hours/week, all trainees)

Objectives: Basic course on technical drawing encompassing use of tools and fundamental skills.

Subjects/Activities:

Lab: Introduction to technical drawing
Use and care of instruments
Lettering
Geometrical constructions
Use of triangles
Copying of drawings to scale
Orthogonal views (front, top, right side)
Conic sections.

Fishing Gear III (Summer Session) - T. C. Visel
(Lect., lab., 3 credits, 6 hours/week, all trainees)

Objectives: Introduction to gill nets, fish pots, conch pots.

Subjects/Activities:

Lecture: Gill nets; types, rigging for surface and bottom fishing
Setting and hauling gill nets
Various types of inshore gill nets such as flag nets, coastal nets, tied down nets, trammel nets
Gill net terminology; types of floats, leads, lead core line (specifications and weights), polyfoam coreline, float lines, and lead lines
How to order gill net materials from a catalog
Hanging ratios and rates with gill net construction
Practical review and introduction to mending simple tears and patching
Crossbar mends, sider mends; "falling away" and "picking up" holes
Review tapering, sidering, sewing.

Lab: Complete cast nets, both tapered and skirts
Construction of a surface monofilament gill net for bluefish, weakfish, and striped bass
Construction of surface monofilament net for mackerel and menhaden
Construction of monofilament bottom gill net for codfish
Fabricate black sea bass pots, half-round with two cut funnels
Fabricate rectangular conch pots.

Vessel Operation III (Fishing) (Summer Session) - G. Gamache, B. T. Mortimer, T. C. Visel, D. J. Ward
(Lab., 2 credits, 3 hours/week, all trainees)

Objectives: To provide sea time exposure in trawling and small boat fishing methods.

Subjects/Activities:

Lab: Trawling (flat nets, high rise, balloon trawls)
Pot fishing (conch pots, lobster traps, fish pots)
Gillnetting (3 types - one sinking codfish, one floating weakfish and bluefish, one floating mackerel and bunker)
Exposure to outboards and practical experience with small boat handling and fishing
Fish handling and icing on board
Deployment of gear, proper setting and handling
Fishing gear construction and repair
Mechanics of outboards and use of haulers
Practical seamanship and boat handling
Use of electronic gear.

Outboard Motor Mechanics (Summer Session) - B. T. Mortimer, T. C. Visel, D. J. Ward
(Lect., lab., 4.5 hours/week, 5 credits, all trainees)

Objectives: Introduction to basic mechanics, 2 and 4 cycle engines. Fundamentals of outboard mechanics - systems, maintenance, repair and preventative maintenance.

Subjects/Activities:

Lecture (D. J. Ward):

Work habits
Identification of tools by name and use
Parts of an outboard engine
Theory of operation of 2 and 4 stroke engines
Scavenging
Combustion process
Definition: Horse power (H.P.), torque, displacement, bore, stroke, work
Gasoline and oils; fuel tanks, fuel pumps, carburetion
Coil and battery ignition
Outboard electrical systems, magneto ignition
Charging circuits, starters and solenoids, regulators and rectifiers
CD ignition systems, batteries, spark plugs, heat range, gapping, inspection
Power head, decarbonizing, piston and rings, cylinder honing and reboring
Cooling systems, air and water cooled engines, water pump and thermostat
Submerged motor service
Lower unit and gear care
Lubrication and care of bearings, packing bearings
Outboard life expectancy, reliability
Propeller size and boat size
Mounting the engine
Fuel consumption and mileage.

Lab (B. T. Mortimer, T. C. Visel):

Subjects: Introduction to basic outboard mechanics
Introduction to types of tools, use and maintenance
Powerheads, lower units, electrical systems
Propellers, water pumps
Fuels and lubrication
Tune-ups, troubleshooting
Care and maintenance of outboards
Proper operation of outboards

Activities: Removal of cylinder head to expose pistons
Lower unit - gear case and propeller shaft assembly, water pump function and replacement, shaft and clutch lubrication
Replace a water pump
Replace shear pin

Outboard Motor Mechanics (continued)

Lab:

Activities:
- Power head assembly (pistons rings connecting rod and crank shaft)
- Introduction to electrical and ignition systems. (Coils points condenser spark plugs)
- Replace a head gasket
- Replace spark plugs and check for proper gap
- Carburetion and carburetor assemply, proper fuel and fueling procedures
- Tune-up procedures and troubleshooting
- Replace points and condensers
- Replace propeller.

Fishing Gear IV - T. C. Visel
(Lect., lab., 4 credits, 6 hours/week, Fishing Captains, Fishing Masters, Diesel Mechanics)

Objectives: Advanced trawl net construction; advanced tapering methods, coastal traps and weirs.

Subjects/Activities:

Lecture: Advanced tapering problems
Gill net construction, terminology, hanging ratios
Gill net hanging phase lengths and rates
Introduction to coastal traps and weirs
Stretched webbing to feet (length of gill net) procedures
Block and cutting plans for trawls
Webbing square formulas for trawls.

Lab: Advanced trawl net construction
Model net plans and construction of model "trawl"
From the model, a 33 ft. high rise trawl was begun.

Vessel Operations IV (Fishing) - G. Gamache, J. Kaelin, T. C. Visel, B. T. Mortimer
(Lab., 3 credits, 3 hours/week, Fishing Captains, Fishing Masters, Diesel Mechanics)

Objectives: Operations aboard a trawler, seiner and small vessel handling.

Subjects/Activities:

Lab: Operations of fishing gear
Boat handling, docking maneuvers
Observation of sea state, weather, wind direction
Filling out the logbook
Purse seining, lobster potting, sea bass potting, conch potting
Bottom, midwater and shrimp trawl.

Marine Engineering I - B. T. Mortimer
(Lect., lab., 4 credits, 5 hours/week, Fishing Captains, Fishing Masters, Diesel Mechanics)

Objectives: Review of fundamentals of simple, 2 and 4 cycle engines, principles of gasoline engines, diesel engines. Use of tools adapted to the job. Safety in the shop. Emphasis on hands-on, practical training.

Subjects/Activities:

Lecture:
The internal combustion engine (inboard and outboard)
2-cycle, 4-cycle engines
Outboards 18-70 H.P.
20-hour check with new motor
Troubleshooting
Fuel system, ignition system, cooling system
Preventative maintenance
Anti-corrosion and protection
Fuel mixture - 2 cycle
Oil, lubrication, and fuel
Starting and operation
Warrantees
Installation instructions
Off-season storage, safety
Basic types of gasoline engines
Horsepower
Electrolysis
Temperature considerations
Types of fires and use of various fire extinguishers
Color codes on board a vessel
Fuel handling, fuel storage
Cooling system heat exchangers
Details of engine parts
Basic types of diesel engines
Diesel fuels
Injectors
Turbochargers

Lab:
Identification of outboard motor components
Tear-down and rebuilding of outboards
Identification of gasoline engine components
Tear-down and rebuilding of gasoline engines
Diesel engine components and operation
Tear-down and rebuilding of diesel engines
Generators and pumps
Use and maintenance of tools, safety measures
Use of testing equipment.

Navigation I - D. J. Ward
(Lect., lab., 3 credits, 3 hours/week, Fishing Captains, Fishing Masters, Diesel Mechanics)

Objectives: Introduction to chart reading, plotting and use of a compass.

Subjects/Activities:
Lecture/Lab: Chart reading
Latitude and longitude
Position by range and bearing
Plane, parallel and mercator sailing
Use of horizontal and vertical sextant angles
Deviation and variation
Ships compass
Plotting a course
Dead reckoning
Effects of tide, current, wind
Compass error.

Fisheries Economics - J. Kaelin
(Lect., 2 credits, 2 hours/week, all trainees)

Objectives: Fundamental principles of economics as applied to the fishing industry.

Subjects/Activities:
Lecture: The economic nature of fish
Factors of protection and production possibilities
Supply and demand curves, shortages and surpluses
Substitutes and inelastic nature of the demand for fish
Business accounting, cost and return sheets
Fisheries management.

Fishery Meteorology - J. Kaelin
(Lect., 2 credits, 2 hours/week, all trainees)

Objectives: Fundamental concepts of meteorology and world weather; basics of forecasting at sea.

Subjects/Activities:
Lecture: Sun's relationship to the earth
Heat, temperature, and heat transfer
Composition of the atmosphere
Differential heating of the earth's atmosphere
Atmospheric measure
Gas laws
Surface winds
Pressure systems
Fronts, air masses, precipitation
Cloud formation
Tropical revolving storms
Weather forecasting and observation
West African semi-arid climate.

Fishing Gear V - T. C. Visel
(Lab., 5 credits, 12 hours/week, Fishing Captains, Fishing Masters)

Objectives: Review of basics and advanced gear fabrication and design.

Subjects/Activities:

Lab: Review hanging ratios, tapering, fyke net circumference and hoop diameters
Review webbing square formulaes for trawls, block plans, cutting plans for tapered net sections
Review trap net construction, fyke net construction, handling lobster pot trawls model net completion
Fabricate vinyl clad wire lobster traps with hand knit funnels
Build 33-ft. high rise trawl nets with chain sweep
Complete 5' x 28' fyke net
Review and practice mending and patching
Review hydraulic fishing equipment
Complete monoply gill net
Construct a small longline
Review fishing methods and equipment.

Marine Engineering II - B. T. Mortimer
(Lect., lab., 5 credits, 12 hours/week, Diesel Mechanics)

Objectives: Principles of diesel engines; preventative maintenance, troubleshooting. Employment of specialized tools and practices; advanced shop skills.

Subjects/Activities:

Lecture: The diesel engine - general principles
Engine ratings, efficiency, installation
Fuels, fuel injection systems, fuel injection pumps
Fuel quantity requirements
Injection nozzles; maintenance
Fuel handling and storage
Fuel storage in tropical areas
Combustion
Engine structure; frames, cylinders and liners
Connecting rods, piston pins, pistons, and rings
Valves, cylinder heads, bearings
Crankshafts, flywheels
Lubrication systems, oil pumps
Oil characteristics, classifications, used-oil analysis
Cooling requirements and systems
Exhaust systems, waste heat recovery
Starting systems; electric, air, hydraulic
Engine drive systems; reverse and reduction gears
Hydraulics
Preventative maintenance and troubleshooting
How to read and interpret service manuals and specification sheets
How to order form parts catalogs.

Lab: Principles of welding, identifying common metals, (volts, ohms, amps), use of acetylene and oxygen arc welders
Use of fiberglass and resins; protective gear, mixing paints
Pipe fitting; threading, cutting, soldering
Dismantle and replacement, Borg-Warner velvet drive transmission
Inspection and identification:
Cummins 340 diesel
Ford Le.am 6 cylinder 107 H.P. diesel
Detroit 671 diesel
Ford 4 cylinder, 6 cylinder 8 H.P. and other fisheries department engines
Rigged ICMRD skiff; fiberglassed vessel, painted sides and bottom; mounted hydraulic hauler, mounted and installed 70 H.P.
Evinrude outboard, launched vessel
Vessel handling and operation of fishing gear.

Navigation II - D. J. Ward
(Lect., lab., 3 credits, 1.5 hours/week, Fishing Captains, Fishing Masters, Diesel Mechanics)

Objectives: Review of basic navigation and chart reading; advanced navigational problems and celestial navigation.

Subjects/Activities:

Lecture/Lab:
- Positioning a vessel by latitude and longitude
- Determining the latitude and longitude of a vessel given two true bearings
- Determining the true bearings of a vessel from a landmark
- Determining the true course and distance between two positions
- Applying deviation and variation to true bearings; compass error
- Determining compass course from a true course
- Determining a true course given a compass course
- Making up and using a deviation card
- The earth's magnetic field and ship's magnetism
- The running fix
- Doubling the angle on the bow
- The four point problem
- Allowing for wind and tide
- The running fix with leeway and effect of wind applied
- The 3 bearing problem
- The tides
- Lines of soundings
- Rising and dipping of lights
- Rules of sixty
- Introduction to the marine sextant
- The 1st and 2nd principles of the sextant
- Errors and adjustments of the sextant
- Horizontal and vertical sextant angles
- Use of the 3 arm protractor
- The solar system and Kepler's laws
- Motion of the earth and moon
- Identification of the stars
- Measurement of time
- The celestial sphere
- Sextant altitude correction
- Latitude by Meridian altitude
- The pole star
- Azimuth and amplitude
- Sight reduction.

Navigation II (continued)

Extra Credit Subjects:

Rising and dipping distances
Adjustment of the marine sextant; perpendicularity side error, parallelism, index error
Vertical sextant angles
The solar system and Kepler's laws
The earth's motion and the celestial sphere
The measurement of time. GMT, time zones, the equation of time
Hour angles: GHA, LAH, GHAY, SHA
Sextant altitude correction
Latitude by maridian altitude
Determination of compass deviation by amplitude and time azimuth of the sun
Ex-meridian altitude
Latitude by pole star
Sight reduction of the sun and of the star by H.O. 229
Radar plot to determine distance and time of closest approach of another vessel
Radar plot to determine true course and speed of another vessel.

Technical Science - D. J. Ward
(Lect., lab., 3 credits, 3 hours/week, all trainees)

Objectives: Introduction to physical sciences of statics, dynamics, electricity, hydrostatics, thermodynamics and their application to shipboard systems and stability.

Subjects/Activities:

Lecture and Lab:
- S.I. Systems of units, basic and derived units, metric prefixes
- Weight, force, mass
- Scallar and vector quantities
- Equilibrium and sum of forces on a body
- Parallelogram and triangle of forces (graph and trigonometry solutions)
- Resultant of several forces, resolution of forces into components
- Calculation of tension in a span, calculation of compression in a boom
- Dynamics
- Velocity and acceleration
- Work and power
- Potential and kinetic energy
- Mechanical advantage and V.R.
- Friction
- Efficiency
- Simple harmonic motion
- Simple machines
- Electricity and magnetism
- Structure of matter and atomic theory
- Current, voltage, resistance, Ohm's law
- Series and parallel circuits
- Power calculations
- Vessel wiring
- Batteries
- Marine corrosion
- Composition and use of paint
- D.C. motors and generators, A.C. generators
- Alternating current
- Diodes and semiconductors
- Inductance and capacitance
- Ignition systems
- Principles of CW, AM, FM radio
- Installation of radios and antennas
- Depth finders
- Sonar
- Loran and Omega navigation systems
- Radar
- Hydrostatics and thermodynamics
- Density and relative density
- Law of flotation
- Archimedes principle
- Pressure and thrust

Technical Science (Continued)

Lecture and Lab: Load lines and draft
Ships' tonnage
Heat
Principles and refrigeration
Ship stability and trim
Propeller considerations and selection.

Vessel Operations V (Fishing) - G. Gamache, B. T. Mortimer, T. C. Vinel
(Lab., 3 credits, 3 hours/week, all trainees)

Objectives: Trawling, seining and small boat fishing.

Subjects/Activities:

Lab: Vessel handling, docking procedures
Station bill
Logbook
Use of electronic aids to fishing
Trawling, seining procedures
Lobster pot, fish pot, conch pot fishing
Use of vinyl clad pots
Long lining
Gill netting
Use of a fyke net and trap net
Quahogging.

Fish Handling and Preservation - C. D. Mortimer
(Lect., lab., 3 credits, 2 hours/week. all trainees)

Objectives: To learn fundamentals of fish spoilage and its prevention; basic preservation and processing techniques; quality considerations.

Subjects/Activities:

Lecture: Commercially important species of finfish and shellfish; anatomy, identification, characteristics
Spoilage causes and effects of fish and shellfish
Onboard handling and sanitation
Fish hold lining, materials, fish hold insulation
Icing, mechanical refrigeration
Refrigerated sea water/chilled sea water systems
Freezing
Salting, pickling, smoking, drying-dehydration, canning
Fish meal, fish oil, fish protein concentrate
Plant sanitation
Processing methods and equipment
Pollution effects/red tide effects upon seafood quality
Marine products, market forms and grading
Utilization of underutilized species
Special handling considerations for tropical areas

Lab: Dressing of fish/filleting
Cleaning squid
Fish marinades
Fish smoking.

New England Institute of Technology

Course Description

Academic Subjects

PHY 120 Basic Physics 4 Class Hours 4 Quarter Credit Hours
Prerequisite: MA 120

Emphasizes the basic concepts and principles. Topics included are electricity, linear motion, force systems, momentum, friction, work, energy.

MA 110 Introduction to College Math
4 Class Hours 4 Quarter Credit Hours

A programmed individualized learning approach allowing students of differing mathematics backgrounds to achieve competence in basic foundations of mathematics. Completion of the course is accomplished by satisfactory completion of a series of examinations demonstrating competence in mathematics at the college level.

MA 120 Technical Math I 4 Class Hours 4 Quarter Credit Hours
Preprequisite: MA 110

Presentation of basic concepts required for advanced technical subjects. Topics include calculator computations, linear and quadratic equations, exponents and radicals, and analytic geometry of the straight line. Also included are vectors on the Cartesian Plane, complex numbers, trigonometric functions, and trig tables.

Electronics

EL 110 Basic Electronics 8 Class Hours 8 Quarter Credit Hours

Ohms law, Kirchhoffs laws, structure of the atom, resistor color codes, solution of DC circuits, sources of electricity, solution of series circuits, parallel circuits, series parallel circuits, grounds, total power in circuits, effects of opens and shorts in series parallel circuits, voltage dividers, current dividers, meters, oscilloscopes, power supplies, signal generators, switches, fuses, wire resistance, semi-conductor physics, potentiometers, rheostats, power rating of resistors, batteries, magnetism, inductor, motor action, Lenz law, Faradays law, alternating voltage generators, inductance reactance.

EL 111 Basic Electronics Lab 8 Lab Hours 4 Quarter Credit Hours

The proper use of test equipment: meters, generators, and oscilloscopes. The study of components in operation achieved through construction of basic circuits from the trainer units and visual observation of their operation.

Electronics (continued)

EL 120 Basic Circuits 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 110 and EL 111

Capacitors, capacitance reactance, solution of AC circuits, RC and LR time constants, AC meters, wattmeters, "j" operator, resonance, filters, tubes, semi conductors, common emitter amplifiers, common base amplifiers, common collector amplifiers, bias stabilization, silicon controlled rectifiers, transistor types, diodes, transistor troubles.

EL 121 Basic Circuits Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 110 and EL 111

Tube and transistor circuits are constructed from the trainer units. Waveforms are viewed on oscilloscopes; voltages are taken with meters in order to observe normal circuit operation. Troubles affecting circuit operation are injected and analyzed with test equipment.

EL 130 Advanced Circuit Theory
8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 120 and EL 121

The study of circuits used in medical electronics, AM/FM video tape recorders, stereo radio, industrial electronics and television are included in this course. Some of the topics covered are: stereo transmission, AM receivers, FM receivers, superheterodyne principles, half wave rectifiers, full wave rectifiers, bridge rectifiers, vacuum tube and transistor amplifier circuits, field effect transistor circuits, automatic gain controls, single side band demodulation, AM demodulation, FM demodulation, stereo receivers, Hartley oscillators, Armstrong oscillators, Colpitts oscillators, Coupling circuits, classes of amplifier operation, audio recording, cathode ray tubes, audio frequency generators, radio frequency generators, signal tracers, power amplifiers.

EL 131 Advanced Circuitry Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 120 and EL 121

Use of voltage and wave form tests to analyze defects. Practical troubleshooting on defective systems. Actual experience in hook-up and use of test equipment. Experiments in recognition of symptoms of defects, and demonstration of some less common servicing procedures.

EL 210 Special Circuit Theory 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 130 and EL 131

AM, FM, TV, stereo receiver alignment, color TV principles, video tape recording, television analyst, video monitors, sweep generators, timing circuits, circuit analysis, TV camera, closed circuit TV systems, differential amplifiers, operational amplifiers, wave shaping circuits, phase comparator circuits, phase lock loop circuits, servo motor and speed controls, digital tuners, resonant power supplies.

Electronics (continued)

EL 211 Special Circuitry Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 130 and EL 131

Recognition and location of defects using color test equipment. Practical troubleshooting of defective color receivers. The application of alignment, color bar generator, television test analyst, meters and oscilloscopes in trouble shooting. Uses of test equipment on specialized circuitry.

EL 220 Basic Digital Logic 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 120 and EL 121

Number systems, logic systems and symbols, truth tables, comprehensive analysis of 7400 TTL integrated circuits. MSI, LSI functions. Emphasis on interrelationship of various digital functions. Counters, multiplexers, shift registers, memories, and basic microprocessor hardware techniques.

EL 221 Basic Digital Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 120 and EL 121

TTL integrated circuit chips are utilized to construct lab circuits that reinforce classroom instruction. TTL data books, logic schematics and TTL circuit pin configurations are used to provide simulated industrial logic circuit experience. The use of the two channel triggered oscilloscope is stressed.

Electricity

EL 112 Fundamental Electricity 8 Class Hours 8 Quarter Credit Hours

The history and scope of the electrical trades, shop and customer relations, safe working practices, occupational goals. Electron theory, Ohm's and Kirchhoff's Laws for series and parallel circuits. Resistance of wires, power and energy concepts are fully presented. Principles of magnetism and magnetic devices. Generation of E.M.F. — batteries, generators, Lenz's Law and inductance.

EL 113 Fundamental Electricity Lab
8 Lab Hours 4 Quarter Credit Hours

Multimeter familiarization for reading voltages. Current and resistance. Determining resistance and wattage in series and parallel circuits. Projects involving operation of electromagnetic devices and RL time constants.

EL 122 Alternating Current 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 112 and EL 113

Rudimentary circuitry for residences, including installation and wiring of receptacle outlets, single and three way switches and grounding of circuits. Generation of alternating current, sine wave analysis. Capacitance, capacitor types and capacitive reactance.

Electricity (continued)

EL 123 Residential Wiring Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 112 and EL 113

Principles of heating and lighting. Electrical installation planning, tool use, wiring apparatus, basic switching circuits and the National Electric Code requirements.

EL 132 Advanced AC Theory 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 122 and EL 123

Solution of series-parallel circuits containing resistance and reactance. Calculations for power, power factor, and power factor correction. Residential wiring requirements for complete residence, lighting, appliance and control circuits. Service entrance calculations, over-current protection, conduit fill calculations, old work, finish work and troubleshooting.

EL 133 Advanced AC Circuits Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 122 and EL 123

Projects demonstrating A.C. principles, use of Frequency Generator RC time constants and RL power consumption. Wiring to combination of receptacle outlets, split circuitry, three and four way switch combinations. Techniques for complete residential wiring.

EL 212 Polyphase Systems 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 132 and EL 133

The study of transformer construction and operation, phasing and paralleling, calculating losses and efficiency. Special transformers such as: Instrument transformers, distribution and autotransformers. Generation of polyphase voltage and current. Three phase transformer construction, operation and connections. Series, shunt and compound direct current motors. Single phase magnetic starters and control circuits.

EL 213 Polyphase Systems Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 132 and EL 133

Series and parallel connections and single phase transformer polarity checks. Three phase transformer connections and DC motor construction and operation, and the wiring of various single phase motor control circuits.

EL 222 Motors and Controls 8 Class Hours 8 Quarter Credit Hours
Prerequisite: EL 212 and EL 213

The study of single phase motor principles, torque and speed calculations. Three phase induction and synchronous motor operation, and the construction and wiring of controllers for three phase motors. N.E.C. Motor branch circuit requirements.

EL 223 Motors and Controls Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: EL 212 and EL 213

Single phase motor construction and operation. Installation of various three phase motor branch circuits involving the use of EMT. Troubleshooting three phase motor branch circuits.

Refrigeration

AH 110 Basic Refrigeration 8 Class Hours 8 Quarter Credit Hours

Heat, and the way in which refrigeration technology is employed to transfer this source of energy. The study of tools and devices utilized to efficiently move this energy from one point to another. Applications of the evaporation and condensation cycle of common refrigerants. Analysis of the design, operation and servicing of the mechanical refrigeration system.

AH 111 Basic Refrigeration Lab 8 Lab Hours 4 Quarter Credit Hours

Fabrication of refrigerant lines and connections that join the various refrigeration components together. The service techniques, as applied to installing manifold gauge sets and temperature measuring devices. Removing, adding or replacing refrigerant charges. Proving operational conditions on live, educational and factory designed equipment.

AH 120 Refrigeration Electricity

8 Class Hours 8 Quarter Credit Hours

Prerequisite: AH 110 and AH 111

The study of electricity as it applies to refrigeration and air conditioning systems. Basic electricity as well as more advanced solid state control systems. Procedures required in the use of all kinds of electrical testers and how they can be used to find electrical problems. Both compressor drive and fan motor circuitry. Hermetic circuits with their associated starting relays and capacitor bank auxiliary equipment.

AH 121 Refrigeration Electricity Lab

8 Lab Hours 4 Quarter Credit Hours

Prerequisite: AH 110 and AH 111

Projects concerned with the use of Voltmeters, Ammeters, Ohmmeters, Wattmeters and Capacitor Bridges. Proving the effects of voltage drop, high resistance contacts, shorts and opens. Related preventive maintenance. Wiring and operation of open and hermetic motors, with a variety of control systems. Troubleshooting all of the common failures which can put the refrigeration plant in jeopardy of improper and costly operation.

AH 130 Commercial Refrigeration

8 Class Hours 8 Quarter Credit Hours

Prerequisite: AH 120 and AH 121

Advanced refrigeration principles involving humidity control as well as temperature. Selection of the low and high sides of a refrigeration system, with stress being placed on the balancing of their capacities for peak efficiency. Specialized study of the design of Walk-ins, Reach-ins, Ice Makers, Low Temperature Cabinets and other commercial fixtures, Installation of both self-contained and remote condensing equipment.

Refrigeration (continued)

AH 131 Commercial Refrigeration Lab
8 Lab Hours 4 Quarter Credit Hours
Prerequisite: AH 120 and AH 121

Controlling temperature and humidity on actual commercial fixtures. Setting the various types of electrical and pressure controls widely used to operate single and two-temperature systems. Production of ice cubes in old and modern machines. Experiments on the effects of ultra-low temperatures on various items and demonstration of the many uses of refrigeration in manufacturing processes. Service techniques as applied to commercial equipment where larger refrigerant charges are needed.

AH 210 Air Conditioning 8 Class Hours 8 Quarter Credit Hours
Prerequisite: AH 130 and AH 131

The study of air and its properties. Psychrometric functions of the air conditioning system and the ability to read-out through the use of Sling and Aspirating Psychrometers. Axial and radial fan designs and the importance they have in delivering the correct amount of air volume to the area being cooled. Basic duct design as applied to simple duct runs. Complete coverage of window and packaged air conditioners. Troubleshooting the many air problems of mechanically and electrically perfect systems. Heat load calculations and selection of equipment to be installed in average installations.

AH 211 Air Conditioning Lab 8 Lab Hours 4 Quarter Credit Hours
Prerequisite: AH 130 and AH 131

Applying the principles of psychrometry in testing an operating air conditioner. A study of the various components that make up the system. Tracing the many refrigerant and electrical circuits used in window and packaged air conditioners. The use of air measuring instruments to determine the actual volume and weight of the air being circulated. Operation of all-weather systems using either steam or electrical heating methods.

AH 220 Basic Heating 8 Class Hours 8 Quarter Credit Hours

Basic electrical theory. Electricity as it applies to oil burner, gas burner, and electrical heating controls. Analysis of stackmounted and cad cell direct fire sensing primary control. Physics of combustion, heat transfer and burner design. Theory of high pressure gun burner. The operation of fuel pump, ignition system, nozzle, air handling equipment and burner motors. The three basic systems, hot water, warm air, and steam systems are explained. The operation of the accessories for these systems is studied.

Refrigeration (continued)

AH 221 Basic Heating Lab 8 Lab Hours 4 Quarter Credit Hours

The installation and servicing of all the controls covered in the classroom are made on live units. All the service techniques are performed on the different types of burners in one of 18 live units. This offers a student an opportunity to familiarize himself with all types of equipment. The student will completely wire up the different heating systems. These will include the installation of all the electrical fittings such as greenfield and electrical metallic tubing.

Ship Systems - D. J. Ward

(Lect., 4 credits, 2 hours/week, technical trainees)

Objectives: Overview and review of shipboard systems of electrical and electronic nature.

Subjects/Activities:

Lecture: Review of F/V Gail Ann shipboard systems:

- electrical wiring
- propulsion (engine system)
- radar
- fathometer
- fish finder (sonar)
- Onan generator
- fire fighting equipment

Typical vessel system layout

Marine electronic devices.

RECOMMENDATIONS

The following recommendations have resulted from our experience with the international fisheries project. Some of the suggestions have arisen from advisory committee discussions and serve as guidelines for future programs of this type.

1. Candidates should have attained the equivalent of a high school diploma or qualify for high school equivalency exams during the first semester. This will insure that trainees possess the basic skills learned in secondary education such as mathematics, science, grammar - composition and study practices.

2. Our experience indicates that trainees have been poorly prepared in mathematics. A background course in mathematics, offered concurrently with the English language training prior to the beginning of the fisheries program, would be useful.

3. A workshop on learning skills and study habits would prepare the trainees for classroom and laboratory training.

4. It is recommended that university housing with dining hall privileges be arranged for future programs. This will alleviate problems of transportation and availability of facilities. More importantly, for the trainees it will promote a sense of belonging in the university community. It will also permit the trainees an opportunity to associate with other students and participate in campus events.

5. Students were provided with medical insurance arranged through the Agency for International Development (AID). It was our experience that trainees preferred to avail themselves of the free medical services of their community, which was a drain upon this service. In other cases, reports and receipts were not sent in a timely manner, which resulted in misunderstandings with local hospitals and doctors. Many of the trainees had medical problems of long-standing which required extensive tests and treatments. All of this resulted in loss of time in class and program staff participation to straighten out paperwork, consult with medical personnel, and arrange for treatment.

   Seemingly, an acceptable solution would be for future programs to avail themselves of the university medical facilities which would be convenient and more pleasant for the trainees.

6. Key program staff should, preferably, visit the prospective country from which trainees will arrive to gain a better understanding of the culture, life-style and fishing industry development. It is therefore recommended that a workshop be conducted for program staff on language and cultural aspects of the subject country and area.

7. The tasks of the trainees need to be defined prior to the beginning of the program. There is a paramount need for the entire concept of the development process and needs assessment of a country to be promoted with and among the trainees.

8. The staff should develop an appropriate training manual for the trainees that could be provided to the trainees for their reference back on the job. Follow up of the trainees is highly recommended to obtain data to improve new training programs.

I4 Lovell Road
Westford, Mass. 01886
March 28, 1983

Prof. Donald McCreight
International Center for Marine Resource Development
University of Rhode Island
Kingston, Rhode Island 02880

Dear Sir:

I have recently returned from Guinea Bissau, where I was employed as a fisheries advisor, and am taking this opportunity to bring you up to date on the current activities of the Guinea Bissau students trained by ICMRD at the Wickford Fisheries School.

Luis Vieira was in the first group of returnees and was initially placed in the Soviet joint venture Estrela do Mar. After having obtained several months of experience, he was assigned to the Cacheu Fisheries Project where he assumed the responsibilities of the country's first fisheries extension officer. During the last year, Luis has been responsible for overseeing the selection, purchasing and distribution of fishing gear and has been instrumental in establishing a successful system of credit. He has received training by an FAO sails expert and has been active in introducing the use of sails and new fishing techniques.

Luis has earned a great deal of respect from the personnel at the Fisheries Secretariat and his advise is often sought by the Fisheries Minister.

It appears that Luis is being groomed as the director of the Cacheu project.

Augostinho Mendes started working for Estrela do Mar and was later assigned to work as an extentionist with Luis Vieira at the Cachau Fisheries Project. He assisted in the selection and distribution of fishing gear but concentrated on introducing new fishing techniques. In one instance, Augostinho introduced a tangle net which caught 70 lobsters in a single day. Thanks to his efforts, plans are being formulated to stimulate lobster fishing by the artisanal sector.

In June, Augostinho was moved to the SIDA (Swedish International Development Agency) supported fisheries project on the Bijagos Islands to fill in for the manager who was on vacation. His performance was so impressive that he was permanently assigned to the project as assistant manager. He is responsible for all financial matters, has instigated changes in the credit system, which was a complete failure before his arrival,

and oversees the activities of 30 or more workers.

Luis Barbosa started work as a diesel mechanic for the U.S. Embassy and later elected to accept a position as mechanic for the Swedish fisheries project. Luis proved himself to be very competent ans is now responsible for repairing, maintaining and ordering parts for all project vehicles, vessels and equipment. He has also been active in modifying and installing small diesel engines in traditional fishing crafts and runs an outboard repair shop which services approximately 130 outboards.

Jose V. Rodrigues has been assigned as a counterpart to a Swedish fisheries expert who is attempting to improve upon traditional fishing methods and introduce new methods. Jose has been given a project vessel and crew and is experimenting with much of the gear that the students constructed at URI.

Eugenio da Costa has replaced Augostinho Mendes as fishing gear extentionist for the Cacheu project which is currently being supported by the European Economic Community. He has been given a 12 meter Brazilian dory equipped with a small diesel and is testing and experimenting with varios methods of fishing.

Abilio Bacai worked for approximately seven months in Estrela do Mar during which time he spent several months fishing on a medium sized Russian trawler. Upon returning he felt that the Russians would not provide him with the opportunity to take on greater responsibilities so he accepted an administartive position with the U.S. Embassy.

Braima Camara has been assigned as a counterpart to a Swedish refrigeration Technician who is training him to accept the responsibility of maintaining and repairing all ice machines and compressors owned by Pescarte, the government organization responsible for artisanal fisheries development. Braima has assisted in the installation of two five ton ice makers on the Island of Bubaque and another 3.7 ton ice maker which was installed at Cacheu. In October he devised a method for significantly reducing the electrical load required to start up compressors at the Bubaque Fisheries Project thus saving the project generator which was previously burning out every six to eight months. As I left, Braima was completing the insolation on a cold storage room which I had designed from an old sea freight container.

Jorge Gomes has been assigned to work as an assistant refrigeration technician for the French- Guinea Bissau Joint venture Semapesca. Unfortunately, the company was faced with several problems and Jorge has not started working. When I last saw him, Jorge was teaching English to three classes a day.

Cesar Nomolini was initially assigned to assist me in developing a pilot system for collecting data on the artisanal fisheries. After several months of training, Cesar was capable of summarizing data on the day to day activities of 350 artisanal

fishermen and was instructing others on how to collect and summarize raw data. In October, he was offered a job as a diesel mechanic but, upon urging from the Fisheries Secretariat, turned it down and is presently supervising a statistical data collection system which monitors the activities of 500 artisanal fishermen and 52 industrial fishing vessels. Cesar has presented reports on the fisheries of Guinea Bissau at two international conferences and was selected to spend a month aboard a French research vessel which was to conduct investigations within Guinea Bissau's EEZ during March.

Cesar, for all practical purposes, has replaced the existing director of the fisheries statistical department, and there is no doubt that, given government encouragement and support, he will continue to do an excellent job.

Several of the remaining students failed to return to Guinea Bissau because their families had left the country and are rumored to be working in Senegal and Portugal.

There is no doubt that the returnees will significantly contribute to the development of the country's fisheries and URI should be pleased with the quality and professional competence of these students.

Respectfully,

Bruce Epler