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UNIVERSITY OF ALGARVE  
Faculty of Sea and Environmental Sciences  
MSc in Marine Biology  
FISHERIES BIOLOGY  
(1st Year-1st Semester)

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## SUMMARIES

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### LESSONS' CONTENTS

#### **Lesson no. 1 – Tuesday, 18/12/2007**

09:00 –10:30 am; Room 1.7 (C.P.)

Fisheries Biology MSc class, an outline: programme overview, recommended literature and assessment details. Introducing some materials available, particularly the use of the course webpage; assignments and due dates, including the final assessment and seminars.

#### **Lesson no. 2 – Thursday, 20/12/2007**

10:30 –12:00 am; Room “Anfiteatro B” (C.P.)

The importance of fishing activities, particularly in Portugal. The self-renewable nature of fish resources. Why is it necessary to monitor, assess and manage fisheries resources? Portuguese and European Institutions involved in fisheries research, administration and management. The importance of fisheries biology studies and its role to improve monitoring programmes to better assess fisheries resources.

#### **Lesson no. 3 – Tuesday, 08/01/2008**

10:30 –12:00 am; Room “Anfiteatro B” (C.P.)

Life cycle of an exploited fish resource during the non-exploitable and exploitable phases, important concepts: recruitment to fishing area and recruitment to fishing gear; cohort and stock definitions; evolution of an exploited cohort; age of recruitment and age at first capture; exploited phase; recruitment patterns and recruitment strength; main aspects of the dynamics of an exploited resource.

Main concepts to retain regarding an exploited stock: abundance and biomass, spawning biomass. Main causes of stock biomass variation.

Different aspects of a stock and associated concepts: Stock structure (stock composition). Stock abundance and stock structure estimation. Catches and landings. Discards.

Fishing effort definition and related concepts: Catch per Unit Effort as indicator of stock abundance. Catch structure by sex, length and age. Catch sampling onboard fishing vessels, in fish markets and landing sites. Commercial fisheries statistics and other

sources of data.

**Class No. 4 – Thursday, 10/01/2008**

10:30 –12:00 h; Room: “Anfiteatro B” (C.P.)

Introduction to age and growth studies. Methods for age determination: direct and indirect age reading methods: fundamentals and applicability. Calcified structures used in age determination using direct methods. Interpretation of growth marks and the need to assess precision within and between age readers, when applicable. Validation of ageing criteria.

Indirect age reading methods. Growth in captivity, mark and recapture methods and length frequency distribution analysis: advantages and disadvantages.

Length frequency distributions analysis: individual sample (individual sample analysis) and integrated methods (integrated analysis of a set of samples collected throughout a period time). Basic assumptions about length distribution at age. Polymodal length frequency distributions and its separation in single modes . Concept of relative age. Different types of length frequency distributions: its utility or non-utility for indirect age determination. Modal progression analysis (MPA). Integrated methods. Fitting growth curves with and without seasonal oscillation. Examples of methods and free software available.

Example exercise used to demonstrate the separation of polymodal length frequency distributions into single modes in a time series of samples. Determination of mean length at relative age and modal progression analysis to identify the different cohorts present and its growth (**Exercises no. 3**).

## **LABORATORY CLASSES' CONTENTS**

**LAB Class No. 1 – Tuesday, 08/01/2008**

14:00 –16:00 (Class A) and 16:00-18:00 (Class B); Room: “LEOA” (PRODEP.)

Introduction: procedures to measure and weigh fishes, molluscs and crustaceans.

How to obtain size measurements in different marine resources: total length in two species of fish (sardine – *Sardina pilchardus* and – Small-spotted catshark - *Scyliorhinus canicula*); total length and mantle length of different cephalopods (octopus – *Eledone cirrhosa*, cuttlefish – *Sepia officinalis* and squids – *Loligo* sp.); total length and cephalothorax length of shrimps (*Penaeus* sp.) and prawns (*Nephrops norvegicus*), carapace length and width of two species of crabs (edible crab – *Cancer pagurus* and spiny spider crab – *Maja squinado*).

**Exercise 1** – Biological sampling exercise to obtain the total length composition (in number and weight) of a random sample of sardine (*Sardina pilchardus*) caught by purse-

seine nets off the Algarve. Objective: To obtain length and weight measurements from sardines. Procedures in the class: Total length was measured to the nearest half centimetre below. Weights were obtained by length class. All measurements obtained were recorded in a sampling sheet provided for this purpose. The sampling sheets with the results were digitalized and made available to students through the webpage.

**Home work (groups of 2/3 students). Results to be revised by 17/01 (14-16:30 pm)**

**Exercise 1** (cont.) – Data analysis: statistical methodology used to analyse length frequency distributions (table and graphic – histogram representation); calculation of main sample statistics: range, mean length, variance, standard deviation, coefficient of variation, modal class and median class. Calculation of mean weights by length class and sample mean weight. Inference exercise: estimation of the 95% confidence limits for the mean length in the catch.

**Exercise 2** – Objective: To estimate sardine catch length composition, in number and weight. Procedures: Using the sample information collected during exercise 1, calculation of a raising factor (catch weight / sample weight) to raise the random sample frequencies to catch level. Calculation of sardine catch weight composition by applying mean weights at length class to catch length frequencies.