

**National Technical University of Athens,
Department of Surveying Engineering,
Laboratory of Higher Geodesy and
DIONYSOS Centre for Satellite Tracking**

**8th Semester Course: «Hydrography - Oceanography»
Academic Year 2009-10**

Full Name:

University Coming From:

Due Date for this Homework: **16 March 2010**

Homework – Theme #1

Objective: The scope of this homework is to familiarize you with the basic terms and definitions and the various essential concepts that are necessary in order to study the oceans and the sea environment. In particular, you are asked to research the bibliography and to retrieve relevant information from the Internet about such topics as important historical milestones in the evolution of oceanography, the various definitions of the different sub-disciplines of hydrography and oceanography, as well as their relation to the modern approach in the study of the Earth as a System.

What you are asked to do is to prepare a brief technical report which will include the sections outlined below. The content of each section should include a synthesis of your understanding of the questions posed and the sub-topics mentioned. Your source of information can be any of the reference books you have access to or from your searches in the Internet using, for example, as starting points the web links provided. In order to prepare your Homework Technical Report you should use the template provided in the web pages of the course.

SECTION 1 – Why is important to study the ocean? Where is the etymological meaning of the term ‘oceanography’ coming from, and historically when this term appeared for the first time? What are the differences between ‘oceanography’ and ‘oceanology’? What are the major sub-disciplines of modern oceanography, and how they relate to the current modern scientific approach of studying the Earth as a System?

Hints: Focus on the definition of hydrosphere and give some statistical information for the amounts of water found in various forms in the earth and the oceans (e.g. size of earth surface covered, volumes, mass, depth, ...). Describe how oceanography fits within the framework of geosciences and the Earth System Science in particular. Make reference to the various branches of modern oceanography and, explain the relation of Oceanography with Hydrography and provide some examples of hydrographic applications that are of interest to Surveying/Geomatics Engineers. Give some thought to why we should study the oceans today (mentioning scientific and socio-economic or practical reasons), and provide your own reasons and concerns and explain why these are important reasons for us to be studying the oceans.

- http://en.wikipedia.org/wiki/Earth_system_science
- <http://www.cotf.edu/ete/ESS/ESSmain.html>

SECTION 2 – What are the most acceptable scientific explanations regarding the origins of the water on Earth, in general, and the existence of the oceans in particular?

Hints: The question of the **origin of water on Earth**, or more accurately put, the question of why there is clearly more water on the Earth than on the other planets of the Solar System, has not been clarified fully so far. There are various popular theories as to how the world's oceans were formed over the past 4.6 billion years. From your search, outline at least three of the most promising explaining theories for the origin of the Earth's oceans.

- http://www.nytimes.com/2008/12/02/science/02earth.html?_r=1&8dpc

SECTION 3 – Significant milestones in the evolution of Oceanography, with particular reference to (a) major inventions, (b) the creation of maps of the seas and oceans, and (c) ocean voyages leading to important expeditions and discoveries.

Hints: The early investigations of the sea were motivated by the requirements of daily survival rather than by the reasons driving oceanographic exploration today. The human endeavors to learn about the sea and its environment are usually classified into four major evolutionary periods of great marine achievements:

- Early History - until about 150 AD
- The Middle Ages (150 AD to late 1400's)
- The Age of Discovery (Latest 1400's to early 1700's)
- Beginning of Voyaging for Science (Late 1700's to 20th century)

For each of these historical periods select 2 specific examples falling into each of the above categories (a), (b) and (c) of achievements and expand briefly why you think that these achievements are important for the development of oceanography.

- <http://www.divediscover.whoi.edu/history-ocean/index.html>
- http://ic.ucsc.edu/~kudela/OS130/Lectures/2005/OS130_032905/OS130S05_L1_History.pdf

SECTION 4 – The oceans and their general characteristics. Major types of seas.

Hints: The definition and delineation of the oceans and seas are part of the role of the International Hydrographic Organization. Make reference to the main subdivisions of the global ocean and list the key statistics (volume, area, maximum and average depth, etc.), physical characteristics and special features (e.g. in geological terms) for each of the oceans. Distinguish between the main types and categories of seas, e.g. Epeiric / Epicontinental Seas, Marginal Seas, Mediterranean Seas, Inland Seas, Closed Seas), ... giving the precise definitions for each of them, together with typical examples of such seas in different oceans.

- <http://en.wikipedia.org/wiki/Ocean>