UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2018/2019
BACHELOR'S DEGREE (BSC)	GEOLOGICAL SCIENCES
SUBJECT	PALAEONTOLOGY WITH LABORATORY
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50188-Ambito geologico-paleontologico
CODE	05509
SCIENTIFIC SECTOR(S)	GEO/01
HEAD PROFESSOR(S)	CARUSO ANTONIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	10
INDIVIDUAL STUDY (Hrs)	162
COURSE ACTIVITY (Hrs)	88
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CARUSO ANTONIO** Monday 9:00 11:00 Stanza del Docente presso il plesso di Biologia Animale di via Archirafi 18, piano terra

DOCENTE: Prof. ANTONIO CARUSO

PREREQUISITES	knowledge of the course contents of the first year.
LEARNING OUTCOMES	Knowledge: Acquisition of the fundamental concepts of Paleontology and of the meaning and use of fossils in the field of Earth Sciences. Concepts of Tafonomia, evolutionary paleontology, taxonomy, stratigraphic paleontology, paleoecology and paleobiogeography. Concepts for the systematic classification of fossil invertebrates. Ability to apply knowledge and understanding: Ability to recognize and classify the fossils to use them in stratigraphy and for paleoecological reconstructions. Autonomy of judgment: Ability to orientate between the various groups of fossils and related sources concerning the Invertebrate Systematics Communication skills: Ability to organize a commentary on fossil records that is understandable to non-specialists. In addition, the course stimulates students to interact with interdisciplinary groups and also prepares them for inclusion in the field of scientific communication and the preparation of appropriate museum structures. Learning capacity: The student is encouraged to bring the theoretical aspects of the evolution of life on the planet into a single framework.
ASSESSMENT METHODS	Oral examination with microscopic and /or macroscopic recognition of 3/4 taxa fossils both isolated and inserted in rocks and relative chronostratigraphic deductions, paleoecological, paleodepositional, taphonomic. In-depth discussion of 2/3 general paleontology topics covered during the course and 2/3 topics of systematic paleontology (invertebrates). We intend to ascertain and evaluate: ability of critical argumentation, integrated vision, and adoption of an appropriate paleontological-stratigraphic technical language. Minimum requirements: recognition of the taxa treated during the examination and its chronological and facies meaning, good knowledge on the main topics of general paleontology and stratigraphy.
EDUCATIONAL OBJECTIVES	The course of Paleontology provides stratigraphic concepts that underlie the course in Geological Sciences and prepares students for more complex studies in the field of Earth sciences. In fact, the acquired notions contribute to forming a figure able to face the study of past paleoenviroments and to compare them with the current ones, in order to reconstruct the evolution of the Earth. The aims of the course are in fact those of a thorough and critical knowledge on the origins of life and on the evolution of organisms, through the study of the main systematic groups of invertebrates and their stratigraphic distribution.
TEACHING METHODS	Lectures, laboratory activities, microscopic and macroscopic observations of taxa and treated fossil groups.
SUGGESTED BIBLIOGRAPHY	TESTI RAFFI S. & SERPAGLI E. – Introduzione alla Paleontologia – UTET. VIALLI V. – Paleontologia. PITAGORA EDITRICE ALLASINAZ A. Paleontologia generale e sistematica degli invertebrati. ECIG Genova, LETTURE INTEGRATIVE LE SCIENZE – “L’Evoluzione” n° 37 settembre 1987 “L’Evoluzione dell’adattamento” n° 37 settembre 1987 “L’Adattamento” n° 37 settembre 1987. APPUNTI DEL CORSO CLARKSON E.N.K., Invertebrate Palaeontology and Evolution. Oxford: Wiley-Blackwell, 1998 AGIP . Southern Tethys Biofacies.

SYLLABUS

Hrs	Frontal teaching
2	Introduction. Generality. Background. Paleontology and its applications.
3	The burial: Notes on fossil lagerstatten. Faunas of Ediacara, Fossils of Burgess Shale Fossilization of organic matter: mummification, carbonification, permineralization (in carbonates, silica, pyrite) cryopreservation. Fossilization of bio-mineralized parts: impregnation (Replacement, Diagenetic dissolution, Models and impressions). The deformations of fossils
3	Stratigraphy. Stratigraphic units. Litostratigraphy. Biostratigraphy, Biozone. Chronostratigraphy. Geochronology. Stratigraphic correlations. Fossils guide.

SYLLABUS

Hrs	Frontal teaching
3	Stratigraphy principles. Biostratigraphy. The use of fossils in stratigraphy. Biostratigraphic or biozone units. Chronostratigraphy. Chronostratigraphic and geochronological units. The scale of standard geological times. The stratotypes of the chronostratigraphic units: the limit stratotype (GSSP), the concept of "golden nail". Overview of paleomagnetic stratigraphy. The use of paleomagnetism in chronostratigraphic correlations. Overview of geochemical methods. The stable oxygen isotopes. The variation curves of the oxygen isotopes as stratigraphic and paleoclimatic signals.
3	Paleoecology. Ecosystems and marine organisms. Environmental factors. Biocenosis, tanatocenosis, orictocenosis. Taxonomic uniformism, functional morphology. Palaeobiogeography. Endemisms. Dispersion and geographical barriers. The evolution of Tethys.
2	Taxonomy principles and Linnaues systematic classification. The species in palaeontology
4	EVOLUTIONAL PALEONTOLOGY: The theories of Lamarck and Darwin. Natural selection. The 'Modern Synthesis'. The genetic nucleus of the Modern Synthesis, the Naturalistic Core of the new synthesis Microevolution and Macroevolution. The theory of the intermittent equilibria. Criticism to the gradualism and uniformity of the speed of the evolutionary process. Microevolution and macroevolution in synthetic theory and in the theory of intermittent equilibria.
4	The principle of preadaptation; examples: Mosaic evolution; examples: the transition between reptiles and birds (Archeopteryx). Evolutionary innovation and behavior. The trend of biological diversity over time. Extinctions and Biological Crisis. The most common causes of extinction. Mass extinctions. Explanatory hypotheses of biological crises. The Permian - Triassic crisis and the Cretaceous - Tertiary crisis.
2	Paleobiogeography and evolution of insular faunal. The islands and paleo - islands of the Mediterranean: characteristics of the populations. Paleobiogegrafic aspects: vicarious and dispersive models. The hypothesis of "land bridges" and the dispersion through filtering barriers.
2	Systematic paleontology. Porifera: General characteristics; classification; ecology; stratigraphy. Coelenterate: General characteristics; Hydrozoans and Scifozoans
8	Microfossils: Calcareous nannofossils. Foraminifera, living environment, limiting factors, types of shell, dimorphism. Macroforaminiferi: Fusulinidae, Neoschwagerinidae, Orbitolinidae, Alveolinidae, Nummulitidae, Orbitoidacea. Planktonic foraminifera. Calpionellidi. Radiolaria (nod). Stratigraphic distributions and sedimentary facies.
2	Antozoas: General; ecology; stratigraphy. Zoantarios: Tetracorals; Sea anemones; Octocorals Ecology of coral reefs. Stratigraphic distribution. Porites, Corallum rubrum, Isidella, Cladocora caespitosa
3	Generality; classification; ecology; stratigraphic distribution. Lingula, Productus, Ryctophenia, Spirifer, Crania, Rhynconella, Terebratula, Pygophe dyphioides,
2	Mollusca: General; ecology; distribution. Amphineura, Monoplacophora, Scaphopoda: Chiton, Dentalium.
2	Lamellibranchia: General; orientation of the valves; evolution; hinges types; ecology; distribution; classification.
2	Systematic classification and stratigraphic distribution of: Trigonia costata, Megalodon gumbelii, Arca, Pecten, Chlamys, Arctica islandica, Panopea norvegica, Mya truncata, Mytilus, Brachydontes, Cardium , Dreissena, Congeria, Pholas, Lithodomus, Venus, Nucula, Tellina, Glycimeris, Ostrea.
2	Systematic classification and stratigraphic distribution of Rudistes: Diceras, Caprina, Radiolites, Hyppurites
3	Gastropoda: General; types of coiling; ecology; distribution; classification. Bellerophon, Patella, Velates, Persististrombus latus ex Strombus bubonius) Buccinum, Murex, Haliotis, Vermetus, Nerinea, Conus, Clio, Nassa, Turritella, Melanopsis.
2	Cephalopoda: general information: Tetrabranchiate cephalopods: NAUTILOIDS: General, embryonic chamber, evolution, ecology, stratigrafic distribution Horthoceras, Gomphoceras Nautilus, Lituites, Aturia aturi.
3	Ammonoids: General, embryonic chamber, fragmocono, septa, sutural diagrams, dwelling chamber, evolution, heteromorphic shells, ecology, distribution, extinction theories, systematic classification. Clymenia, Goniatites, Ceratites nodosus, Phylloceras, Lytoceras, Turrilites, Aspidoceras.
2	Dibranchiates: Belemnoidei, Sepioidei, Teutoidei, systematic classification and stratigraphic distribution. Duvalia lata, Belemnitella, Argonauta, Spirula, Sepia oficinalis, Loligo vulgaris, Octopus vulgaris.
2	Arthropoda. Systematic classification and stratigraphic distribution. Calymene, Phillipsia, Paradoxites, Olenus.
3	Echinodermata.Pelmatozoa, Cystoidea, Blastoidea, Crinoidea, Holothuroidea, Stelleroidea

Hrs	Workshops
24	Optical microscope recognition and macroscopic recognition of the treated fossils (isolated forms, thin sections, rocks) of the main systematic groups among the invertebrates. Methods of sampling of fossils for stratigraphic and paleocological studies. Methods of study and preparation of fossils.