UNIVERSIDAD SAN FRANCISCO DE QUITO
SCHOOL: CIENCIAS BIOLÓGICAS Y AMBIENT.
COURSE : ECL 0320 - THE TREE OF LIFE AND THE ORIGIN OF SPECIES
Semester: First Semester 2018/2019 **- NRC:** 4182
Hours: MTWTHF 09:00 - 12:00 (Classroom 1-GAIAS)

INSTRUCTOR INFORMATION:
NAME: Jaime Alfonso Chaves Cevallos
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OFFICE: GAIAS
OFFICE HOURS: 14:00 – 17:00

COURSE INFORMATION:
CREDITS: 4
PREREQUISITES: One semester General Biology

COURSE DESCRIPTION:
Have you ever wondered why are we here and how did we get here? How species originated and why the evolutionary tree of life (TOL) is at the core of all biological sciences?

By exploring the TOL you will begin to disentangle the diverse histories of organismal diversification and will discover how all life on Earth is related. This class will allow you to answer the most important question in biology, the one that Charles Darwin grasped in his "Origins of Species". We will use the Galapagos as the backdrop to test these hypotheses and immerse into the flora and fauna of this "Laboratory of Evolution". This class has key principles like biodiversity, taxonomy, evolution, cladistics, phylogenetics, geology, ecology, climate and adaptation, and uses the TOL from a novel phylogenetic perspective (the best tool to reconstruct the TOL!) with the simple goal of understanding the organization of life and its origins.

We will use student-centered pedagogies such as collaborative in class-group and discussion. Classic speciation and biodiversity papers will be mandatory readings and these will be complemented with up to date research on the origin of species and evolution on the Galapagos Islands. Field trips will contribute to the understanding of species adaptation to changing landscapes and the effect of adaptive forces. That is, you will learn from the formation of corals in the Galapagos to the adaptation of marine iguanas, and the role oceanic currents and geology shaping the unique species found on this archipelago.

Students will be proficient in understanding the utility of phylogenies, cladistics and molecular techniques in current biology topics, and its applicability in different fields of research. Students will be capable of using genetic data (downloaded) to explore the TOL, and be able to answer related questions in the fields of ecology, phylogeography, conservation biology, evolutionary history, phylogenetics, and molecular evolution.

SPECIFIC COURSE LEARNING OUTCOMES:

Number	Learning Outcome	Level
1	Students will understand the analytical approach to Tree Thinking and the importance of the Tree of Life (TOL)	High
2	Students will grasp the fundamental aspects of DNA, phylogenetics and evolution to understand the origin of species	High
3	Students will acquire skills to produce phylogenetic trees from genetic sequence data	High
4	Students will understand the power of phylogenetic trees answering ecological and evolutionary questions and how to relate species in the TOL	High
5	Students will be able to read literature based on evolution, speciation, taxonomy, biodiversity and adaptation	Mid
6	Students will be able to describe the process of evolution (character, distribution, behavior) on the TOL in a temporal framework (Geologic time)	

COURSE CONTENT:

Topic 1: Overview and introduction
Topic 2: What is the Tree of Life
Topic 3: How are species related to each other and the importance of DNA
Topic 4: Phylogeny reconstruction from molecular data (DNA)
Topic 5: Evolution and adaptation in the TOL (Case studies Galapagos)
Topic 6: The origin of species (theory and examples)
Topic 7: Phylogeography, ancestral state reconstruction, clade age
Topic 8: How to preserve the TOL? Population genetics and conservation genetics

METHODS AND INTEGRATIONS BETWEEN THEORETIC AND PRACTIC CONTENTS:

The teaching methodologies used to teach USFQ courses, following the philosophy of Liberal Arts, foster dialogue and facilitate the construction of knowledge through the continuous exchange of ideas and experiences between professors and students. It is expected that in all courses the theoretical concepts will be linked to the professional practice and work contexts where students will perform in the future, with the intent to integrate activities and simulations of a diverse nature that promote the understanding of practical and realistic contexts.

COURSE EVALUATION:

Category	Details	Percentage of the final grade
Lead discussion	Lead discussion of scientific papers	20
Final Test	Final Test: cumulative	25
Research paper	Research paper: written	25
Final presentation	Final presentation: oral	5
Class Participation	Discussion, readings	5
Video	Video	20

GRADING SCALE

Percentage	Grade	Consideration	Points
91-100%	A	Excellent	4
81-90%	B	Good	3
71-80%	C	Intermediate	2
61-70%	D	Deficient	1
-60%	F	Failed	0

Description of the evaluation categories:
Guidelines

Lead discussion of scientific papers:
Student will be evaluated on the clearness and understanding of the subject.
Final Test:
Cumulative written test of topics covered in lecture and papers.
Research paper:
Personal or group effort on a topic of interest following a scientific paper format.
Final presentation (oral):
Oral presentation of student work on selected topics to the class and questions by the class.
Class Participation:
Grade provided at the end of class on their active participation in class and in the field.
Field Report:
Video-document exploring the origin, adaptation, and evolution of a set of species on the Galapagos (or elsewhere), and where they fall in the TOL.

MAIN BIBLIOGRAPHY (NOT MANDATORY):

Dawkins R. 2009. The Greatest Show on Earth: The Evidence for Evolution. Free Press, Transwold.

Baum, D. and Smith S. 2013. Tree Thinking: An Introduction to Phylogenetic Biology. Roberts & Company Publishers.

POLICY:
All courses are governed by the USFQ student manual, which can be downloaded at Manual del Estudiante

About Electronic Equipment: Cell phones, Ipods and other electronic devices (except personal computers and Ipad only for taking notes) have to be switched off in the class.

ASSISTANCE: Come to class on time. In the case of illness or any other justified cause, students can be relieved from classes and excursions and cover the qualification with additional tasks.

SCHEDULE OF ACTIVITIES:
Week 1: Overview and introduction
Week 1: What is the Tree of Life
Week 1: How are species related to each other and the importance of DNA
Week 1: Field trip (Hacienda Guadalupe: first Friday)
Week 2: Phylogeny reconstruction from molecular data (DNA)
Week 2: Phylogeography, ancestral state reconstruction, clade age
Week 2: How to preserve the TOL? Population genetics and conservation genetics
Week 2: Field Trip (Punta Pitt: second Friday)
Week 3: The origin of species (theory and examples)
Week 3: Evolution and adaptation in the TOL (Case studies Galapagos)

This syllabus was reviewed and approved by the academic coordinator of the major/department, such that all sections should follow this syllabus. If it is necessary to make changes/adjustments to the syllabus, please ask the academic coordinator so that the approved changes/adjustments are reflected in the Curriculum Design system.