

COURSE: Foundations of Psychobiology I

CODE: 800140

DEPARTMENT: Psicobiología

TEACHERS:

Prof. Dr. Fernando COLMENARES (Lectures + practical activities)

Dr Pilar CASADO MARTÍNEZ (practical activities)

Course goals:

Foundations of Psychobiology I is an introductory biology course for psychologists. It is intended to provide psychology students with an integrative and evolutionary-comparative perspective about the biology of fitness-enhancing observable behaviours (e.g., life-history patterns, sexuality, parenting, sociality, prosociality, morality) and its underlying unobservable cognitive processes and drivers (e.g. social learning, imitation, empathy, emotions, decision-making, mentalizing). The course will rely heavily on a non-reductionist, pluralistic systems biology approach that emphasizes the integration of proximate (mechanistic and developmental) and ultimate (adaptive and evolutionary) explanations for events and processes that operate at different levels of the biological hierarchy, from molecules to ecosystems. Nevertheless, the main target level is the behaviour and the mind of whole organisms. The stance adopted in the course will also emphasize top-down approaches, downward control, dialectical, bidirectional relationships, and the comparative perspective. Central questions for the psychology curriculum such as, among others, the role of nature versus nurture, or biology versus culture in human behaviour, will be addressed by crossing and re-crossing the levels of biological organization and by examining how different scientific disciplines tackle and cross-fertilise these hot and long-standing controversial issues.

Course contents (syllabus)

The course is organized around five major module topics: concept and method of psychobiology, evolution, development and inheritance, ethology/comparative psychology, and principles of cell signalling and transmission in the nervous system. At the end of the course, students are expected to have a good grasp of a set of basic concepts and theories about the integrative biology of behaviour which enable them to appreciate the scope and importance of psychobiology within psychology and as a behavioural science. They are also expected to master the skills needed to apply their knowledge for developing critical thinking about and analysing human behaviour from both proximate and ultimate perspectives.

MODULE I. CONCEPT AND METHOD OF PSYCHOBIOLOGY

Unit 1. Concept of psychobiology

Unit 2. Method and techniques of psychobiology

MODULE II. EVOLUTION

Unit 3. Evolutionary thinking and evolutionary theories

Unit 4. Evolutionary mechanisms, processes and outcomes

Unit 5. Biodiversity, phylogeny and evolutionary transitions

Unit 6. Patterns and processes in human evolution.

MODULE III. DEVELOPMENT AND INHERITANCE

Unit 7. Principles of development and inheritance

Unit 8. Genes, organism, and environment

Unit 9. Genetic and epigenetic inheritance, parental effects, and ecological and cultural inheritance

MODULE IV. Behaviour and Psychological Processes in Evolutionary Context

Unit 10. Behaviour, psychological profile, health and survival

Unit 11. Reproduction and sexual and parental behaviour

Unit 12. Social behaviour, communication, and sociality

Unit 13. Behaviour, emotion, and cognition

MODULE V. FOUNDATIONS OF CELL SIGNALING AND COMMUNICATION IN THE NERVOUS SYSTEM

Units 14-16. Cell biology of the nervous system. Generation, transmission, and integration of neural signals. Neurotransmitters and principles of drug action

Course description and assessment system

The course comprises lectures, seminars, practical sessions (including small-group activities in the class/computer room and field work), student presentations, online activities, student essays, and homework. There will also be complementary face-to-face (individual and group) and online tuition and supervision available.

Student's knowledge and level of achievement of required learning objectives and outcomes will be assessed via multiple-choice tests and the quality of written forum contributions. There will be 2 tests per module (except module 5), one at the end of each module and the other when the course is done. There will be a pass mark per module and each module will make a different contribution to the overall module mark, based on each module's content material. The overall module mark will represent 70-80% of the course's final grade. The remaining 20-30% contribution will be the cumulative mark for such student activities as practical sessions, presentations, essays, and class attendance.

The final marking/grading will be as follows:

0-4,9: fail (SS).

5,0-6,9: pass (AP).

7,0-8,9: very good (NT).

9,0-10: outstanding (SB).

Resources

Textbooks

Boyd, R. & Silk, J. B. (2017). *How Humans Evolved*. Norton, International Student Edition.

Breedlove, S.M. y Watson, N.V. (2020). *Behavioral neuroscience*. Oxford University Press, Oxford.

- Colmenares, F. (2015). *Fundamentos de psicobiología, Vol. 1: Conceptos, principios, evolución, desarrollo y herencia*. Madrid: Síntesis.
- Colmenares, F. (2015). *Fundamentos de psicobiología, Vol. 2: Comportamiento y procesos psicológicos en contexto evolutivo*. Madrid: Síntesis.
- Futuyma, D.J. & Kirkpatrick, M. (2018, 4th ed.). *Evolution*. Sinauer.
- Gilbert, S. F. & Epel, D. (2015, 2nd ed.). *Ecological Developmental Biology: Integrating epigenetics, medicine, and evolution*. Sunderland, MA: Sinauer.
- Hills, D., Heller, C., Hacker, S.D., Hall, D.W., Laskowsky, M.J. & Sadava, D. (2020, 12nd ed.). *Life, the science of biology*. Sinauer, Sunderland, Mass.
- Rubenstein, D.R. & Alcock, J. (2019). *Animal behavior*. Oxford University Press, Oxford.

Basic references

- Audesirk, T. et al. (2011). *Biology, Life on Earth with Physiology*. Pearson.
- Bateson, P.P.G. y Martin, P. (2000). *Design for a life, how behavior develops*. Vintage, London.
- Davies, N. B., Krebs, J. R. y West, S. A. (2012). *An introduction to behavioural ecology*. Wiley-Blackwell, Oxford.
- Dugatkin, L.A. (2009). *Principles of animal behavior*. Norton, London.
- Dunbar, R.I.M. (2020). *Evolution, what everyone needs to know*. Oxford, Oxford University Press.
- Gluckman, P., Beedle, A. & Hanson, M. (2009). *Principles of evolutionary medicine*. Cambridge University Press, Cambridge.
- Lewontin, R. (2000). *The triple helix. Gene, organism and environment*. Harvard University Press, Cambridge, Mass.
- Martin, P. y Bateson, P.P.G. (2007). *Measuring behaviour. An introductory guide*. Cambridge University Press, Cambridge.
- Mayr, E. (2002). *What evolution is*. Phoenix, London.
- Mayr, E. (1997). *This is biology, the science of the living world*. Harvard University Press, Cambridge, Mass.]
- Nelson, R.J. (2023). *An introduction to behavioral endocrinology*. Sinauer, Sunderland, Mass.
- Noble, D. (2006). *The music of life, biology beyond genes*. Oxford University Press.
- Noble, D. (2016). *Dance to the tune of life, biological relativity*. Cambridge University Press, Cambridge.
- Pinel, J.P.J. & Barnes, S.J. (2022). *Biopsychology*. Allyn & Bacon.
- Sapolsky, R.M. (2004). *Why zebras don't get ulcers? Guide to stress, stress-related diseases, and coping*. Freeman, San Francisco.
- Sapolsky, R. (2017). *Behave. The Biology of Humans at Our Best and Worst*. UK: Penguin Random House.
- Zimmer, C. (2018). *She Has Her Mother's Laugh. The Story of Heredity, Its Past, Present and Future*. Picador, London.