



## Why Should a Student in MSc BEC Consider Taking the BEE Specialisation?

While thinking about enrolling in the “Behaviour, Economics, and Evolution” (BEE) Specialisation of MSc BEC you may be asking yourself whether you should really pick a Specialisation that includes courses that are clearly outside a “normal” biology curriculum, and focus on topics such as economics. We will here explain to you why studying economics is relevant for an MSc BEC student, and that the BEE Specialization is a very interesting opportunity that you should seriously consider for a number of good reasons.

### 1. A Unique Opportunity

The composition of the courses offered by the 30 ECTS BEE Specialisation is, to the best of our knowledge, totally unique. Besides courses from MSc BEC, it involves course from MSc Economics and MSc Management from the Faculty of Business and Economics (HEC) of the University of Lausanne, and you will have interdisciplinary classes with students from these two Masters of Science as well. We are not aware of any equivalent **study program** anywhere else, although other universities are now considering setting up programs at the interface between biology and economics. So if you are interested in having a profile that distinguishes you from the masses on the market, the BEE Specialisation provides a great opportunity to get there and the chance to broaden your background in exciting and interesting directions.

### 2. Why Knowing Some Economics Matters for an MSc BEC Biologist?

#### 2.1. Economics

Economics is the study of decision-making when individuals have limited resources and interact and transact with each other. Many things that humans do on a daily basis, from interactions within the family to relations between nations, involve taking decision about the coordination of resource use and exchange that affect many individuals. Economics broadly studies how such decision can be taken in a well-informed manner.

Why does this matter for biology? As a biologist of MSc BEC you are typically taught how organisms evolve and interact with their environment. But it is also fundamental to have a clear understanding of how humans interacts with their own environment—the economic + the social + the natural environment (and the linkages thereof)—as this is crucial for achieving sustainable resource use in the era of climate change. Further, plants and animals typically take decisions about how to allocate limiting resources to competing ends during their lifetime (they face a budget constraint), and insights from economics, in particular results about optimization, growth, and game theory, are useful to understand the functioning of all organisms.

## **2.2. Economics That you will study in the BEE specialization**

The BEE Specialization does not cover courses from all fields of economics (for instance, finance, industrial organization, or accounting are not covered), but it focuses on the important concepts of economics that pertain most to (evolutionary) biology, as the following details.

### ***Microeconomics***

Microeconomics addresses how individual decisions and behaviours affect the supply and demand for resources, which determines prices, which in turn affect resource supply and demand in an intertwined system. To that aim, microeconomics studies what information individuals use to take decision, how this impact on the market, and what are the conditions under which a market (or a decentralized system) leads to global efficient non-wasteful resource allocation and when this fails.

Why does this matter for biology? If you want to conserve some wildlife game, knowing how the market works can help understanding how to curb demand for poaching. If you are interested in understanding how plants and animal grow and function, knowledge about how resources are optimally allocated under constraints and time discounting can help you understand how organisms have evolved.

### ***Game theory***

Game theory is the study of cooperation and conflict between interacting individuals; it is the science of decision making for humans, most species, and computers. From allowing to set up informational efficient voting systems, to interactive computation, to peace treaties, game theory is the quantitative branch of the social sciences that has witness the strongest developments in the last half a century, as it provides means to predict the behaviour of thing that act and react to each other.

Why does this matter for biology? Suppose you want to make a policy intervention, for instance, introduce a new fishing rule to change the behaviour of a collective of fishers or preserve a precise quantity of a stock of fish. Then, it is useful to know what is the optimal regulation rule or whether any regulation is incentive compatible at all given diverging interests, which is what game theory allows you to do. Suppose on the other hand, you are interested in understanding how a population of fish adapts to change in predation rate and make some quantitative prediction about this. Here, game theory ideas can help too and they have lead to the understanding of the evolution of traits as diverse as the sex-ratio, signalling in parent-offspring conflict, or how many different species will coexist on a given resource gradient.

### ***Environmental economics***

Economic development and population growth creates huge pressures on the natural environment. In some cases it is possible to use markets or institutional regulations to successfully manage scarce environmental resources and human externalities on the environment. Environmental economics studies how societies can use economic incentives along with regulations to align private and public objectives to protect the environment and achieve sustainable resource use.

Why does this matter for biology? Typically, as a biologist you may assume that it is good to protect the environment. However, without clear incentives and regulations this cannot be achieved in a world with diverging interests. Environmental economics provides tools to carry out environmental valuation; design incentive compatible policies to reduce global diversity loss or control pollution. Environmental economics also studies how resources (renewable or non-renewable) can be optimally extracted and to form prediction about how systems respond to changes in policies. In other words, it provides real-world environmental problem-solving tools and is a truly interdisciplinary field, integrating biology and economics.

### ***Beyond the basics***

Courses in the above fields are mandatory if you take the BEE Specialisation, but once you have this background you can take optional courses from a large pallet (like “Behavioural economics”, “Political and Institutional Economics”, “Economic Growth”, “Social and Economic Networks”, “Leadership Development”, “Judgment and Decision Making”). Here you can structure your course composition to get the most out of the BEE Specialisation and push forward the blend between biology and economics. This will allow you to obtain the means to make well-informed decisions in an ever-changing world that faces many challenges; as Leon C. Megginson put “it is not the strongest or the most intelligent who will survive but those who can best manage change”.

### **3. What does the BEE Specialization Bring to my Career Prospects when I leave the UNIL?**

When you complete your MSc BEC, there are two main career paths open to you. You can either find a job in the private/public sectors or pursue a PhD in biology.

If you plan to go into the private or public sector, the BEE Specialisation offers you distinctive qualifications to work in environmental conservation and/or natural resource management. By being a biologist and having done courses in economics, you will also have *economics awareness*, which gives you strong credential to many employers, as having some understanding of the economic system and the market is fundamental to many employers. The BEE Specialisation also offers a signal that you are flexible, skill intensive, and can integrate very diverse sources of information and cross boundaries.

If you plan to take a PhD in a field of biology that revolves around behaviour and resource use (e.g., behavioural ecology, human evolution, social evolution, conservation biology, ecology) you will have more interdisciplinary foundations and a stronger quantitative and conceptual background. The insights of economics that are taught in the BEE Specialisation will give you good foundations about of how to incentive behaviour and knowledge about how systems involving resource allocation work, which is generally useful for evolutionary biology. The BEE Specialisation can also open you up to a new and exciting interdisciplinary field of research.

As you can see, we are enthusiastic about the opportunities that the BEE Specialisation offers and hope that these explanations help you to make an informed decision about joining in.