

Supervisor: **Ing. Miroslav Blaženec, PhD.**
Specialist: Ing. Rastislav Jakuš, PhD.
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: **Study of interactions in the spruce - bark beetle system using UAV
obtained hyperspectral and thermal data**
Form of study: full-time

Annotation:

The health status of spruce stands is directly related to their resistance or predisposition to bark beetle infestation. Based on information on the health status of stands and populations of bark beetles, further spread of damage can be modelled. Within the proposed thesis, the student will evaluate the data obtained from the scanning of forest stands by hyperspectral and thermal sensors carried by UAVs in the GIS environment and bark beetles infestation models will be created. Areas with a known state of the characteristics found with terrestrial measurements and observations will serve as a reference.

Supervisor: **Ing. Miroslav Blaženec, PhD.**
Specialist: Ing. Rastislav Jakuš, PhD.
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: **Influence of semiochemicals and phytohormons in the system spruce
- bark beetles**
Form of study: full-time

Annotation:

Semiochemicals (primary attractants, pheromones and anti-attractants) significantly influence the search for the host by bark beetles, the intrinsic mechanism of bark beetle attack, and spruce's defence-ability. The proposed work aims to contribute to further understanding of these mechanisms based on laboratory and field experiments, including chemical analyses. The field experiments will simultaneously collect volatile substances close to the tree stems with a parallel run of the *Ips typographus* host acceptance inoculation experiments.

Supervisor: **Ing. Rastislav Jakuš, PhD.**
Specialist: Ing. Miroslav Blaženec, PhD.
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: Relationship between spruce stand health and spatial dynamic of bark beetle infestation spreading.
Form of study: full-time

Annotation:

The health status (vigour) of spruce stands is directly related to their resistance to bark beetle infestation. On the basis of information on the historical development of forest damage by bark beetles and the health status of stands obtained mainly from time series of satellite images, further spread of damage can be modelled. Within the proposed topic, time series data obtained by aerial and satellite sensors from model areas in areas affected by the gradation of bark beetle will be evaluated in a GIS environment and spread models will be produced.

Supervisor: **Ing. Benjamín Jarčuška, PhD.**
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: **Biogeography and ecology of Orthoptera in Carpathians**
Form of study: full-time

Annotation:

Assessing biodiversity of Orthoptera using taxonomic, functional and phylogenetic diversity in Carpathian Mountains is the main objective of the PhD-thesis. The thesis will analyse and assess the importance of various factors determining selected Orthoptera species distribution in the study area while taking into account operating scale of factors. Revealed patterns of orthopteran diversity and their determinants, association between environmental characteristics and species abundance are expected to be important for understanding of evolutionary processes generating biodiversity. Such knowledge is important for predictions how global change will affect species distribution and survival and for biodiversity conservation.

Supervisor: **Ing. Marek Ježík, PhD.**
Specialist: RNDr. Ľubica Ditmarová, PhD.
Study programme: Forest Ecology
Field of study: Forestry
Topic: **Stem diameter variations of forest trees, their seasonal dynamics at different growth stages in relation to physiology, climate and weather variability.**
Form of study: full-time

Annotation:

Frequency and intensity of extreme environmental stresses, such as droughts and heat waves have increased during the last decades, and are expected to keep increasing along the 21st century. The health and survival of forest ecosystems will be closely linked to their adaptability to changing environmental conditions. High-resolution dendrometers show the capability to capture complex signals integrating tree stems' irreversible plastic growth, reflecting in particular the dynamics of xylogenesis, and reversible elastic fluctuations related mainly to the atmospheric evaporative demands, water availability and subsequently tissues' water potential and transpiration. They are therefore considered to be unique high-potency tools for capturing forest productivity and sensitivity to environmental stresses. The aim of the work is to identify and compare the potential of dendrometers for the detection of threshold values of stress and vitality of trees and stands in different growth stages.

Supervisor: **Mgr. Peter Kaňuch, PhD.**
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: **Acoustic and foraging ecology of forest bats in Carpathians**
Form of study: full-time

Annotation:

Bats in conservation practice belongs to endangered species, the protection of which indirectly contributes to the protection of other species in the environment. Populations of vulnerable forest bats and their habitats are especially exposed to threats associated with global changes. The PhD project deals with acoustic ecology that link behaviour and activity of bats with their environment and diet. Thus the main objective of the thesis is to study adaptation mechanisms which are involved in the habitat use and survival of populations of bat species and their roles in altering forest ecosystem. A special focus will be paid on the ecology of the giant noctule, one of the rarest and least known bat but the most charismatic species in Europe.

Supervisor: **Ing. Emília Ondrušková, PhD.**
Specialist: Mgr. Zuzana Jánošíková, PhD.
Study programme: Ecology and Biodiversity Conservation
Field of study: Ecological and Environmental Sciences
Topic: **Temperature adaptation and pathogenicity of the fungus *Dothistroma pini***
Form of study: full-time

Annotation:

In the recent years, the progress of global climate leads to increase the risk of introduction of disease and pests. At the same time, they can find suitable conditions for their life in new climatic terms and behave more aggressively. Relatively little is known about potential impact of climate change on the life cycle, adaptation possibilities or virulence of pathogenic fungi.

The fungus *Dothistroma pini* is a recently introduced pathogen of pine needles in Slovakia. Dissertation thesis will engage on of temperature adaptation of genetically and geographically different populations of *D. pini* fungus in order to find out the colonization potential of this fungus and its ability to adapt to changing environmental conditions. Further aim of the dissertation thesis will be to evaluate the virulence of these different fungal strains using pathogenicity test. Both experiments will be performed under controlled laboratory conditions.