



Module syllabus: *Biological Invasions*

1. Overall information

Module coordinator	prof. dr hab. Barbara Tokarska-Guzik
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ECTS	6
Method for the verification of learning outcomes	<p>The final grade for the module is weighted on the average of the following student activities:</p> <ul style="list-style-type: none">- written final exam (0.4)- average evaluation from tests on the content of the laboratory classes (0.3)- active participation in the laboratory classes (continuous evaluation of practical skills, tests and reports) (0.3) <p>To be awarded a final grade, the student must have passed each activity of the module.</p> <p>Grades: below 51% – fail (F); 52-60% – with minimum academic criteria (E); 61-65% – satisfactory (D); 66-75% – good (C); 76-85% – very good (B), ≥ 85% – excellent (A)</p>

2. Description of student activity and work

Lecture/discussion sessions	
Responsible instructors	prof. dr hab. Barbara Tokarska-Guzik, dr Aneta Spyra, dr Łukasz Depa
Content	<p>The purpose of the module is to acquaint students with the problem of biological invasions (of plants, animals, fungus, microorganisms, GMO) and of their natural, social and economic consequences. Students will learn the terminology that is used in the ecology of invasions and the patterns and processes of biological invasions in terrestrial, freshwater and marine ecosystems as well as the current research directions of invasive species.</p> <p>Lectures/discussion sessions comprise the core subjects in invasion ecology, including the methodology that is applied in the research and control programmes.</p> <p>Lecture/discussion session content:</p> <ol style="list-style-type: none">1. Biological invasions – explaining the phenomenon and the terminology that is used. History and research directions of invasive plant species. Alien invasive plants and the consequences of invasions.2. Methods and programmes of eradicating invasive plant species in relation to the regulations that are in force.3. Invasions in numbers – contemporary research projects and prospects of further research (<i>Department of Botany and Nature Protection</i>)4. Characteristic features of alien species that make invasions possible. Invasions into freshwater environments – the mechanisms and methods of introduction.5. The influence of the transformation of the environment on the invasion processes and effects. Environmental and economic consequences of animal invasions (<i>Department of Hydrobiology</i>)6. Origins and timeline of historical and ongoing animal invasions7. Biology of the most invasive vertebrate and invertebrate pests.8. Methods for the physical, biological and chemical management (<i>Department of Zoology</i>)
Number of didactic hours	15





(contact hours)	
Literature	<ol style="list-style-type: none">1. Elton Ch. 1958. <i>The Ecology of Invasions by Animals and Plants</i>. Methuen & Co./Chapman & Hall, Kluwer Academic Publishers BV, Chicago2. Alien Species in Poland http://www.iop.krakow.pl/ias/en/project3. van Ham, C., Genovesi, P., Scalera, R. 2013. Invasive alien species: the urban dimension, Case studies on strengthening local action in Europe. Brussels, Belgium: IUCN European Union Representative Office. 103pp. Available from: www.iucn.org/publications4. Invasive alien species in Switzerland Factsheets. An inventory of alien species and their threat to biodiversity and economy in Switzerland FOEN 2006 [pdf]5. Cromarty P.L. <i>et al.</i> 2002. Eradication planning for invasive alien animal species on islands the approach developed by the New Zealand, Department of Conservation, pp. 85-91. In: Veitch, C. R. and Clout, M. N. (eds.). <i>Turning the tide: the eradication of invasive species</i>. IUCN SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. http://issg.org/database/species/reference_files/ratnor/Cromarty.pdf

Laboratory	
Responsible instructors	Staff of <ul style="list-style-type: none">- Department of Botany and Nature Protection- Department of Hydrobiology- Department of Zoology
Laboratory projects/field visits	<p>During laboratory and field visits students will take part in:</p> <p>Identifying invasive plant species based on herbarium materials and the available sources. Identifying the biological traits of plants that support invasions. Discussing invasive plants in farming, forestry, health care and horticulture in relation to the legal documents that are in force. Discussing, summarising and presenting the latest theoretical and practical achievements in the ecology of invasion—presenting a report from a visit to "the crime scene" in the field; final exam (<i>Department of Botany and Nature Protection</i>)</p> <p>Biological invasions in freshwater environments in Poland. Part 1. Molluscs as an example of invasive animals in the inland waters in Poland. Part 2. Invasive species of Crustaceans (Gammarids) in freshwater environments in Poland. Final exam – hydrobiological parts (<i>Department of Hydrobiology</i>).</p> <p>Oral presentations of students introducing the selected invasive animal species highlighting their native range, means of introduction, course of invasion, impact and management. Students' own work with source material – original scientific papers and communications – designed to describe the current status of the selected cases of invasions by invertebrate and vertebrate animals (<i>Department of Zoology</i>)</p>
Methodology of laboratory classes/field visits	Independent work and in groups under the supervision of the staff, including: <ul style="list-style-type: none">• Designing and accomplishing a procedure• Discussing and presenting the results• Protocols commitment and presentation
Number of didactic hours (contact hours)	45
Literature	<ol style="list-style-type: none">1. Tokarska-Guzik B. <i>et al.</i> 2012. <i>Rośliny obcego pochodzenia w Polsce ze szczególnym uwzględnieniem gatunków inwazyjnych</i>. [Alien plants in Poland with particular reference to invasive species] Generalna Dyrekcja Ochrony Środowiska, Warszawa http://www.gdos.gov.pl/files/artykuly/5050/invasive_plants_poland.pdf2. van Ham, C., Genovesi, P., Scalera, R. 2013. Invasive alien species: the urban dimension, Case studies on strengthening local action in Europe. Brussels, Belgium: IUCN European Union Representative Office. 103pp. Available from: www.iucn.org/publications3. Keller <i>et al.</i> 2011. Invasive species in Europe: ecology, status and policy. Environmental Sciences Europe Bridging Science and Regulation at the Regional and European Level





	201123:23, DOI: 10.1186/2190-4715-23-23 https://enveurope.springeropen.com/articles/10.1186/2190-4715-23-23 4. other on-line sources given by instructors
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3. Forms of verification

Continuous evaluation of knowledge, activity and practical skills	
Grades	<p>Grades are awarded on a scale of A-F, where A is the best and F is a fail.</p> <p><u>An excellent performance (A)</u> – the student actively participates in the laboratory/field work, demonstrates an excellent understanding of the experimental/field procedures (their aims, sequence and outcomes), is engaged and creative in solving current problems and in assessing and presenting the experimental results.</p> <p><u>A good performance (C)</u> – the student demonstrates good judgment and knowledge, correctly performs an experiment, correctly exhibits a sense of the experimental procedure, properly assesses and presents the experimental results.</p> <p><u>A satisfactory performance (E)</u> – the student demonstrates satisfactory judgment and knowledge, is poorly engaged and needs additional help to finish the experiment and final assessment of the experimental results correctly, presents a satisfactory presentation of the experimental results.</p> <p><u>A performance that does not meet the minimum academic criteria (F)</u> – the students is not engaged in the experiment, does not exhibit a sense of experimental procedures, interprets and presents the experimental results poorly.</p>
Reports from realised laboratory projects	
Evaluation	<p>Evaluation is comprised of judgment and knowledge related to sense and methods of the laboratory project, engagement in the realisation, quality of assessment and presentation of the experimental results, usage of reference materials.</p> <p>Grades for reports are awarded on a scale of A-F, where A is the best and F is a fail.</p> <p>An excellent report (A) – without any essential errors</p> <p>Fail (F) – no report</p>
Final exam	
Grades	<p>Grades are awarded on a scale of A-F, where A is the highest and F is failing fail.</p> <p>Excellent (A) – the student presents fluent knowledge in the field of biological invasions, has minimal errors that do not affect quality of the exam.</p> <p>Good (C) – the student presents good knowledge in the field of biological invasions, makes rare but subtle errors.</p> <p>Satisfactory (E) – the student exhibits satisfactory knowledge, but with a poor understanding of the field of biological invasions and makes subtle errors.</p> <p>Fail (F) – the student does not present satisfactory knowledge in the field of biological invasions and makes many substantial errors, which disqualify their test.</p>

