UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

ALIEN SPECIES AND BIODIVERSITY

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (01/03/2022 - 10/06/2022)
ECTS	6
Language	

The activity is split

509709 - **ALIEN SPECIES AND BIODIVERSITY MOD. 1**

509710 - **ALIEN SPECIES AND BIODIVERSITY MOD. 2**

UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

ALIEN SPECIES AND BIODIVERSITY MOD. 1

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/05 (ZOOLOGY)
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (01/03/2022 - 10/06/2022)
ECTS	3
Lesson hours	29 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	OCCHIPINTI ANNA CARMEN (titolare) - 3 ECTS
Prerequisites	Basic knowledge of ecology, zoology and botany is required. Moreover, because most of the material that will be proposed is in English, we recommend students to have a sufficient level of scientific English.
Learning outcomes	The course aims to provide basic knowledge on the impacts of invasive alien species on animal biodiversity. Alien species are in fact one of the main environmental emergencies and are considered by the international scientific community the second cause of biodiversity loss on a global scale, after habitat loss and fragmentation. Students will be provided with tools useful to evaluate the effects associated with introductions, with particular attention on terrestrial Vertebrates.
Course contents	We will discuss the information processing mechanisms that might facilitate survival and reproduction of the first few generations of invaders in a new environment, which need to detect and investigate new resources, and develop the skills to exploit them, while learning to

	detect and avoid unknown, naive predators. With this aim, we will try to understand how animal invasions are affected by life history traits and behaviour, both being part of a same adaptive strategy. We will discuss the sequence of steps characterised invasion processes, that start with the transport of a species outside its geographic range, its introduction into a novel environment, establishment (i.e. survival and reproduction) and then spread. In this context, we will explore the role played by dispersal mechanisms in the success of invaders. Ample space will be devoted to the effects of invasive species on biodiversity conservation, including the reduction of native species and alterations of habitats that may follow important changes to the ecosystem, but also the consequences on human activities, as well as threats to the human well-being on health and infrastructure. Specific topics related to each of the most involved wildlife groups will be discussed, with particular reference to Vertebrates, such as adaptation and coevolution of species in response to biological invasions, focusing on emblematic cases both on a global scale and in Italy, like the brown rat (Rattus norvegicus), coypu (Myocastor coypus), North American gray squirrel (Sciurus carolinensis) and other alien squirrels, and American vison (Neovison vison).
Teaching methods	Lessons will be in presence using power point support and the pdf of the presentation will be available on the KIRO platform. At the end of each lesson, some time will be dedicated to actively discussing any issues that will arise. Specific case studies will be analysed in depth. Two visits/surveys will be organised, with the main aim of applying field methods for the census and control of alien species.
Reccomended or required readings	Materials will be provided using online databases, scientific articles and international reports, all easily accessible via internet. However, here is a list of suggested English books: Lockwood J.L. et al., 2013. Invasion Ecology, 2nd edition. Wiley and Blackwell. ISBN 978-1-4443-3364-0 (hardback : alk. paper) – ISBN 978-1-4443-3365-7 (softback : alk. paper) – ISBN 978-1-118-57078-4 – ISBN 978-1-118-57080-7 – ISBN 978-1-118-57081-4 (emobi) – ISBN 978-1-118-57082-1 (epub) – ISBN 978-1-118-57083-8 (epdf) 1. Clout M. N., Williams P. A., 2009. Invasive Species Management. A Handbook of Principles and Techniques. Oxford Press University. ISBN 978–0–19–921632–1 (Hbk.) ISBN 978–0–19–921633–8 (Pbk.) Autori vari, 2009.Handbook of Alien Species in Europe. Springer. ISBN: 978-1-4020-8279-5 e-ISBN: 978-1-4020-8280-1 Jeschke M., Heger T., 2018. Invasion Biology Hypotheses and Evidence. CABI. ISBN-13: 978 1 78064 764 7 Simberloff D.,2013. Invasive Species (What Everyone Needs to Know). Oxford University Press.
Assessment methods	There will be a single exam for the two Modules, which will be carried out and evaluated by both professors. During the oral exam, students will be asked to present a case study, e.g. using a power point support, which will have to be consistent with the topics discussed during the lessons. Further questions will be asked to ascertain the overall level of knowledge.

	The final mark (0-30) will be based on the level of knowledge of the students and their correct use of the terminology; moreover, the preparation and organisation of the presentation will be also be evaluated.
Further information	
Sustainable development goals - Agenda 2030	Module 1 of the course Alien Species and Biodiversity is aligned with goals 13 (Climate action), 14 (Life below water) and 15 (Life on land) of the UN agenda 2030 $lbl_legenda_sviluppo_sostenibile

UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

ALIEN SPECIES AND BIODIVERSITY MOD. 2

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	BIO/07 (ECOLOGY)
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (01/03/2022 - 10/06/2022)
ECTS	3
Lesson hours	29 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	PAGANELLI DANIELE - 3 ECTS
Prerequisites	Basic knowledge of ecology, zoology and botany is required. Moreover, because most of the material used during the course will be in English, it is recommended that students have a good level of scientific English.
Learning outcomes	The aim of Module 2 of the course Alien Species and Biodiversity is to understand and analyse different aspects of the management of alien species both from scientific and legislative points of view. National and international projects will be presented to the students in order to understand how the issues posed by alien species are managed in Italy and Europe. Moreover, students will be encouraged to actively discuss the proposed case studies. Thus, at the end of this module, students will be able to evaluate the effects of biological invasion on terrestrial and aquatic ecosystems.
Course contents	In Module 2, European, Italian and regional regulation for the management of alien species will be presented, with particular attention

	on the assessment methods of impacts (e.g., socioeconomics, human health, and ecosystem services) caused by alien species. Furthermore, several national and international case studies and good practices for the contrast of invasive alien species will be presented during the lessons. More specifically, during Module 2, the students will have the opportunity to focus their attention on the invasive fauna and flora in Italy, particularly on freshwater and marine ecosystems. Finally, possible actions to mitigate the impacts of alien species will be described.
Teaching methods	Lessons will be in presence using power point support and the pdf of the presentation will be available on the KIRO platform. At the end of each lesson, some time will be dedicated to actively discussing any issues that arise. During the practical exercises, the most relevant tool for the impact assessment of invasive alien species will be explained and applied by the students. Moreover, specific case studies will be analysed in depth. Finally, in collaboration with the professor of Module 1, a site visit will be organised. On this occasion, methods for the control and management of aquatic and terrestrial invasive alien species will be shown.
Reccomended or required readings	Due to the constant updating of the topics proposed during the course, the teaching material will be provided using online databases, scientific articles and international reports, which are easily accessible via internet. However, here is a list of suggested English books: - Lockwood J.L. et al., 2013. Invasion Ecology, 2nd edition. Wiley and Blackwell. ISBN 978-1-4443-3364-0 (hardback : alk. paper) – ISBN 978-1-4443-3365-7 (softback : alk. paper) – ISBN 978-1-118-57078-4 – ISBN 978-1-118-57080-7 – ISBN 978-1-118-57081-4 (emobi) – ISBN 978-1-118-57082-1 (epub) – ISBN 978-1-118-57083-8 (epdf) 1. - Clout M. N., Williams P. A., 2009. Invasive Species Management. A Handbook of Principles and Techniques. Oxford Press University. ISBN 978–0–19–921632–1 (Hbk.) ISBN 978–0–19–921633–8 (Pbk.) - Autori vari, 2009.Handbook of Alien Species in Europe. Springer. ISBN: 978-1-4020-8279-5 e-ISBN: 978-1-4020-8280-1 - Jeschke M., Heger T., 2018. Invasion Biology Hypotheses and Evidence. CABI. ISBN-13: 978 1 78064 764 7 - Simberloff D.,2013. Invasive Species (What Everyone Needs to Know). Oxford University Press.
Assessment methods	During the oral exam, students will be asked to present a case study using power point support. During their presentation, students will be asked to explore different aspects that arose during the lessons, and further questions will be asked. The exam will be evaluated in accordance with the professor of Module 1, and the final mark will be based on the level of knowledge of the students and their correct use of the terminology; moreover, the preparation and organisation of the presentation will be also be evaluated.
Further information	
Sustainable development	

goals - Agenda 2030	Module 2 of the course Alien Species and Biodiversity is aligned with goals 13 (Climate action), 14 (Life below water) and 15 (Life on land) of the UN agenda 2030 $lbl_legenda_sviluppo_sostenibile