

BDE 345 Invasion Biology

Short description of the module

Biological invasions provide fascinating opportunities to improve our understanding of how the world works (from genes to ecosystems), but invasions also represent a major challenge to our sustainable use of resources (from impacts on rural communities to effects on major shipping companies). As such invasion science involves a wide range of disciplines. Biological invasions are widely recognised as one of the main threats to both the conservation of biodiversity, and the maintenance of ecosystem services worldwide. In many parts of the world, the most challenging and time-consuming tasks of conservation biologists and managers are those relating to controlling alien species and preventing impacts, and, increasingly, repairing systems already damaged by aliens. The interaction between invasions and other drivers of global change creates fascinating areas for research.

The aim of this module is to provide an introduction to the exciting and important field of "invasion science" – the full spectrum of fields of enquiry that address issues pertaining to alien species and biological invasions.

BDE 345 Indringer Biologie

Kort beskrywing van die module

Biologiese invalle bied fassinerende geleenthede om ons begrip van hoe die wêreld werk (van gene tot ekosisteme) te verbeter, maar invalle verteenwoordig ook 'n groot uitdaging vir ons volhoubare gebruik van hulpbronne (van impak op landelike gemeenskappe tot uitwerking op groot rederye). As sodanig behels invalswetenskap 'n wye reeks dissiplines. Biologiese invalle word wyd erken as een van die vernaamste bedreigings vir beide die bewaring van biodiversiteit en die instandhouding van ekosisteedienste wêreldwyd. In baie dele van die wêreld is die mees uitdagende en tydrowende take van bewaringsbioloë en -bestuurders dié wat verband hou met die beheer van uitheemse spesies en die voorkoming van impakte, en, toenemend, die herstel van stelsels wat reeds deur vreemdelinge beskadig is. Die interaksie tussen invalle en ander drywers van globale verandering skep fassinerende gebiede vir navorsing.

Die doel van hierdie module is om 'n inleiding te gee tot die opwindende en belangrike veld van "invalwetenskap" – die volle spektrum van ondersoekvelde wat kwessies rakende uitheemse spesies en biologiese invalle aanspreek.

Module summary

Name	BDE345
Duration	2nd semester
Academic commitment*	16 credits = 160 notional hours 6 contact hours per week
Scheduled learning opportunities	3 lectures per week 1 practical per week
Assessment option	Option 4
Language option	Option 3
Mode of offering	Face-2-Face
Corequisites / Prerequisites / Pass prerequisites**	<i>Prerequisite pass modules - any three of the following six modules:</i> • Biodiversity and Ecology 212, 214, 224, 244, 254, 264

**Notional hours are the learning time that it would take an average learner to meet the outcomes of the module.*

***The onus is on the students to ensure that they meet the prerequisites of the module.*

Outcomes

After completion of this course you should:

- Have an understanding of the terminology used in invasion ecology
- Be able to explain pathways and vectors of alien species
- Understand the major invasion hypotheses and how these relate to ecological processes that limit and facilitate invasions
- Be familiar with approaches to managing invasions
Be familiar with risk assessment in an invasion context

Module-oorsig

Naam	BDE 345
Duur	2de semester
Akademiese verbintenis*	16 krediete = 120 veronderstelde ure 6 kontakure per week
Geskeduleerde leergeleenthede	3 lesings per week 1 prakties per week
Assesseringsopsie	Opsie 4
Taalopsie	Opsie 3
Modus van aanbieding	In persoon
Newevereistes / Voorvereistes / Slaagvoorvereistes**	Slaagvoorvereiste modules - enige drie van die volgende ses modules: • Biodiversiteit en Ekologie 212, 214, 224, 244, 254, 264

**Veronderstelde leerure is die tyd wat die gemiddelde leerder aan die module sal moet spandeer om aan die uitkomst van die module te voldoen.*

***Die onus rus op die studente om te verseker dat hulle aan die voorvereistes van die module voldoen.*

Uitkomst

Na voltooiing van hierdie kursus behoort jy:

- Begrip te hê van die terminologie wat in invalsekologie gebruik word
- In staat wees om paaie en vektore van uitheemse spesies te verduidelik
- Verstaan die hoofinvalhipoteses en hoe dit verband hou met ekologiese prosesse wat invalle beperk en fasiliteer
- Vertroud wees met benaderings tot die bestuur van invalle
- Wees vertroud met risikobepaling in 'n invalskonteks

<p>Scheduled learning opportunities The official timetable indicating all scheduled learning opportunities and their allocated venues can be accessed via My.SUN.</p> <p>Lectures All lectures will be presented as live Powerpoint presentations, and these slides (non-narrated) will be made available on SunLearn for study purposes.</p> <p>Practicals All practicals are compulsory, and you will be expected to submit an assignment for each submodule's practicals</p>	<p>Geskeduleerde leergeleenthede Die amptelike rooster wat al die geskeduleerde leergeleenthede en die toegewysde venues aandui, is beskikbaar by My.SUN.</p> <p>Lesings Alle lesings sal as in persoon Powerpoint voordragte aangebied word, en hierdie notas (sonder stemopnames) sal op SunLearn beskikbaar gestel word vir studie doeleindes.</p> <p>Praktika Alle praktika is verpligtend en daar sal van jou verwag word om 'n werkopdrag vir elke submodule se praktika in te dien</p>
<p>Study material Recommended text book: Van Wilgen et al (2020) Biological invasions in South Africa. See link to free online version on SUNLearn.</p> <p>Lockwood et al (2013) Invasion ecology. Blackwell Publishing, Oxford. This book is NOT required but you may find it helpful.</p> <p>SUNLearn is the official learning management platform of Stellenbosch University. Each module has a dedicated page on this platform which can be accessed via this link: https://learn.sun.ac.za/</p>	<p>Studiemateriaal Voorgestelde handboek: Van Wilgen et al (2020) Biologiese invalle in Suid-Afrika. Sien skakel na gratis aanlyn weergawe op SUNLearn.</p> <p>Lockwood et al (2013) Invalsekologie. Blackwell Publishing, Oxford. Hierdie boek is NIE nodig nie, maar jy kan dit nuttig vind.</p> <p>SUNLearn is die amptelike leerbestuursplatform van die Universiteit Stellenbosch. Elke module het 'n toegewysde blad op hierdie platform met toegang via hierdie skakel: https://learn.sun.ac.za/</p>
<p>Lecturers Prof. T.B. Robinson-Smythe (TBR) – course coordinator; trobins@sun.ac.za Prof. D.M. Richardson (DMR) – rich@sun.ac.za</p> <p>Course assistant Mrs. Janette Hutton (JH) - janette@sun.ac.za</p>	<p>Dosente Prof. T.B. Robinson-Smythe (TBR) – kursuskoördineerder; trobins@sun.ac.za Prof. D.M. Richardson(DMR) – rich@sun.ac.za</p> <p>Kursus assistent Mev. Janette Hutton (JH) - janette@sun.ac.za</p>

Assessment

The dates for all centrally scheduled assessments are published on [My.SUN](#).

This module follows assessment option 4. Please see the [Faculty of Science's assessment guidelines](#) for more details.

Method of assessment	Description	#	Allocated marks	Dates	Criteria
Assignment	Textbook box	1	5%	11.08	All tests and assignments must be written and handed in to pass the module, AND an average mark of 50% must be obtained.
A1 Assessment	Class test	2	25%	01.09	
Assignment	Field trip report	3	15%	04.09	
Assignment	Management report	4	20%	08.09	
A2 assessment	Final test	5	35%	08.11; 14h00	

Please see the assessments and promotion chapter in the [SU Calendar Part 1 \(General\)](#) for institutional rules regarding assessments.

Calculation of final marks

This course is a flexible assessment module. The final mark will be calculated as follows:

Class test:	25%
Field trip report:	15%
Management report:	20%
Textbook box:	5%
Final Test:	<u>35%</u>
	100%

Note: To pass this course you require a subminimum of 45% average for the tests and a final mark of at least 50%. **No exceptions will be made.**

Assesserings

Die datums van alle sentraal geskeduleerde assesserings word op [My.SUN](#) gepubliseer.

Hierdie module volg assesseringsopsie 4. Raadpleeg die [Fakulteit Natuurwetenskappe se assesseringsriglyne](#) vir meer besonderhede.

Metode van assessering	Beskrywing	#	Punte toegeken	Datums	Kriteria
Taak	Handboekboks	1	5%	11.08	Alle toetse en werksopdragte moet geskryf en ingehandig word om hierdie module te slaag. EN 'n gemiddelde punt van 50% moet behaal word
A1 assessering	Klastoets	2	25%	01.09	
Taak	Veldreisverslag	3	15%	04.09	
Taak	Bestuursverslag	4	20%	08.09	
A2 assessering	Finale toets	5	35%	08.11; 14h00	

Raadpleeg die hoofstuk oor assessering en promovering in [Deel 1 \(Algemeen\) van die US Jaarboek](#) vir institusionele reëls oor assesserings.

Berekening van finale punte

Hierdie kursus is 'n buigsame assesseringsmodule. Die finale punt sal soos volg bereken word:

Klastoets:	25%
Veldreisverslag:	15%
Bestuursverslag:	20%
Handboekboks:	5%
Finale toets:	<u>35%</u>
	100%

Let wel: Om hierdie kursus te slaag benodig jy 'n subminimum van 45% gemiddeld vir die toetse en 'n finale punt van minstens 50%. **Geen uitsonderings sal gemaak word nie.**

Absenteeism (Missed opportunities)

Please see the section 11 of the [SU Calendar Part 1 \(General\)](#) for the institutional rules regarding absence from classes and or tests. Take note that for any absence from the university *for more than one* teaching, learning or assessment opportunity, for whatever reason, students need to apply for leave of absence from the Registrar's office.

In the event of missing a test or important deadline, a valid, original medical certificate must be handed to Mrs. Janette Hutton within 5 days after the test of the assignment hand-in date. A replacement oral test will be scheduled within one week (7 days) after the original test date. It is the responsibility of the student to establish the time and place of this oral. No postponement will be granted for the hand in of assignments or practical reports, and a penalty of 5% per day will be subtracted from all such assignments.

Afwesigheid (die misloop van 'n leergeleentheid)

Raadpleeg asseblief afdeling 11 in [Deel 1 \(Algemeen\) van die US Jaarboek](#) vir die institusionele reëls met betrekking tot afwesigheid van klasse en of toetse.

Neem kennis dat studente by die Registrateur moet aansoek doen vir verlof tot afwesigheid, vir watter rede ook al, van *meer as een* onderrig-, leer-, of assesseringsgeleentheid,

Indien jy 'n toets of belangrike sperdatum mis, moet 'n geldige, oorspronklike mediese sertifikaat aan Mev. Janette Hutton gegee word binne 5 dae na die toets of die werksopdrag inhandigingsdatum. 'n Vervangings mondelinge toets sal geskeduleer word binne een week (7dae) na die oorspronklike toetsdatum. Dit is die verantwoordelikheid van die student om vas te stel waar en wanneer die mondeling sal plaasvind. Geen uitstel sal verleen word vir die inhandiging van werksopdragte of praktiese verslae nie, en 'n straf van 5% per dag sal afgetrek word van al sulke werksopdragte.

Communication

The **announcement forum on the SUNLearn module page** is the only official platform that will be used to make announcements relevant to this module. Please check this regularly.

For communication with individual students, lecturers, support staff and peer-to-peer facilitators will only use students' official SUN email addresses.

Students are also requested to use their official **SUN email addresses** for all academic related communication to: trobins@sun.ac.za

Kommunikasie

Die **aankondigingsforum op die SUNLearn moduleblad** is die enigste amptelike platform wat gebruik sal word om aankondigings, wat relevant is vir hierdie module, te maak. Kontroleer dit asseblief gereeld.

Vir kommunikasie met individuele studente, sal dosente, steunpersoneel en eweknie-fasiliteerders slegs studente se amptelike SUN-e-posadresse gebruik.

Studente word ook versoek om hul amptelike **SUN-e-posadresse** vir alle akademiese verwante kommunikasie te gebruik: trobins@sun.ac.za

Addressing challenges

For any complaints, the first port of call is the class representative or the lecturer. If not satisfactorily resolved, it can be escalated to the Head of Department or [Coordinator: Academic and Student Affairs](#).

Hantering van uitdagings

Vir enige klagtes, is die klasvertegenwoordiger of dosent die eerste plek om hulp te soek. Indien die probleem nie bevredigend opgelos word nie, kan dit na die Departementshoof of [Koördineerder: Akademiese- en Studentesake](#) verwys word.

Academic Misconduct

Academic misconduct includes plagiarism, collusion, cheating and fabrication as stipulated in the [Disciplinary code for students of Stellenbosch University](#). The [SU Policy on Plagiarism](#) defines plagiarism as: "The use of the ideas or material of others [including AI generative tools, such as ChatGPT or Bing] without [appropriate] acknowledgement, or the re-use of one's own previously evaluated or published material without acknowledgement (self-plagiarism)." Such acknowledgement would include referencing the source of previously expressed ideas or published materials, or acknowledging the contribution of e.g. the AI tool, as stipulated for a specific assessment or assignment.

Plagiarism is regarded as a serious offence. More serious cases are handled as set out in the [Stellenbosch University procedure for the investigation and management of allegations of plagiarism document](#). Less serious cases are dealt with by the module coordinator and respective department as set out by the procedures of the faculty.

Akademiese Wangedrag

Akademiese wangedrag sluit plagiaat samespanning, bedrog en versinsel in, soos bepaal in die [Dissiplinêre kode vir studente van die Universiteit Stellenbosch](#). Die [US Belied oor Plagiat](#) definieer plagiaat as: "Die gebruik van die idees of materiaal van ander [insluitend KI generatiewe gereedskap, soos ChatGPT of Bing] sonder [toepaslike] erkenning, of die hergebruik van 'n mens se eie voorheen geëvalueerde of gepubliseerde materiaal sonder erkenning (self- plagiaat)." Sodanige erkenning sal insluit die verwysing na die bron van voorheen uitgedrukte idees of gepubliseerde materiaal, of die erkenning van die bydrae van bv. die KI-instrument, soos bepaal vir 'n spesifieke assessering of opdrag.

Plagiat word as 'n ernstige oortreding beskou. Ernstiger gevalle word hanteer soos uiteengesit in die [Universiteit Stellenbosch se dokument oor die prosedure vir die ondersoek en bestuur van bewerings van plagiat](#). Minder ernstige gevalle word deur die modulekoördineerder en betrokke departement hanteer soos uiteengesit in die fakulteitsprosedures.

Course structure: Lectures will be held on Mondays (09h00 – 09h50, 3005), Wednesday (12h00 – 12h50, 2020) and Thursday (08h00 – 08h50, 2020)

Term 3				Term 4			
Week	Time	Topic	Lecturer	Week	Time	Topic	Lecturer
24 - 28 Jul	Mon 09:00	Introduction	TBR	18 - 22 Sep	Mon 09:00	Measuring impacts	TBR
	Wed 12:00	Invasion Science - History, terminology, concepts			Wed 12:00	Types of impacts	
	Thurs 08:00	Understanding dispersal			Thurs 08:00	Impacts case study	
30 Jul – 4 Aug	Mon 09:00	Pathways	TBR	25 - 29 Sep	Mon 09:00	Heritage Day	TBR
	Wed 12:00	Propagule pressure & population growth			Wed 12:00	National strategy & status report (Prof John Wilson)	
	Thurs 08:00	Geographic patterns			Thurs 08:00	Impact Assessment (Dr Sabrina Kumschick)	
7 - 11 Aug	Mon 09:00	Major hypotheses in invasion ecology	DMR	2 - 6 Oct	Mon 09:00	Prevention, early detection & eradication	DMR
	Wed 12:00	National Women's Day			Wed 12:00	Risk analysis for alien species	
	Thurs 08:00	Disturbance			Thurs 08:00	Economics (Dr Emily McCullough-Jones)	
14 - 18 Aug	Mon 09:00	Resistance	DMR	9 - 13 Oct	Mon 09:00	Species traits & Invasiveness	TBR
	Wed 12:00	Facilitation			Wed 12:00	Climate & invasions	
	Thurs 08:00	The alien species management toolbox			Thurs 08:00	Invasions in the marine environment	
21 - 25 Aug	Mon 09:00	Working for Water: South Africa's ground-breaking programme for invasive alien species management	DMR	16 - 20 Oct	Mon 09:00	The status of marine invasion science in SA	TBR
	Wed 12:00	Biological control of alien invasive plants: The South African experience			Wed 12:00	Crypticity in invasions	
	Thurs 08:00	Managing tree invasions: Insights from the tree invasions world capital			Thurs 08:00	Genetic applications in an invasion context	
28 Aug – 1 Sep	Mon 09:00	Conflicts of interest in managing invasive alien species	DMR	23 - 27 Oct	Mon 09:00	Invasions in protected areas	TBR
	Wed 12:00	Alien plant invasions & native plant extinctions: a six-threshold framework			Wed 12:00	The need for an interdisciplinary approach	
	Thurs 08:00	Invasion syndromes			Thurs 08:00	Self-study	
4 - 8 Sep	Mon 09:00	Warfare as a trigger for invasions	DMR				
	Wed 12:00	Urban invasion ecology (Dr Luke Potgieter)					
	Thurs 08:00	Self-study					
University Recess: 11 – 15 Sep							

Kursusstruktuur: Lesings word gehou op Maandae (09h00 – 09h50; 3005), Woensdag (12h00 – 12h50; 2020) en Donderdag (08h00 – 08h50; 2020)

Kwartaal 3				Kwartaal 4			
Week	Tyd	Onderwerp	Dosent	Week	Tyd	Onderwerp	Dosent
24 - 28 Jul	Mon 09:00	Inleiding	TBR	18 - 22 Sep	Mon 09:00	Meting van impakte	TBR
	Wed 12:00	Indringerbiologie - geskiedenis, terminologie, konsepte			Wed 12:00	Soorte impakte	
	Thurs 08:00	Verstaan van verspreiding			Thurs 08:00	Impak gevalllestudie	
30 Jul - 4 Aug	Mon 09:00	Paaie	TBR	25 - 29 Sep	Mon 09:00	Erfenisdag	TBR
	Wed 12:00	Voortplantingsdruk & bevolkingsgroei			Wed 12:00	Nasionale strategie en statusverslag (Prof John Wilson)	
	Thurs 08:00	Geografiese patrone			Thurs 08:00	Impakbepaling (Dr Sabrina Kumschick)	
7 - 11 Aug	Mon 09:00	Hoof hipoteses in inval-ekologie	DMR	2 - 6 Oct	Mon 09:00	Voorkoming, vroeë opsporing en uitwissing	DMR
	Wed 12:00	Nasionale Vrouedag			Wed 12:00	Risiko-analise vir uitheemse spesies	
	Thurs 08:00	Versteuring			Thurs 08:00	Ekonomie (Dr Emily McCullough-Jones)	
14 - 18 Aug	Mon 09:00	Weerstand	DMR	9 - 13 Oct	Mon 09:00	Spesie-eienskappe en indringervermoë	TBR
	Wed 12:00	Fasilitering			Wed 12:00	Klimaat en invalle	
	Thurs 08:00	Die uitheemse spesie bestuur gereedskapkas			Thurs 08:00	Invalle in die mariene omgewing	
21 - 25 Aug	Mon 09:00	Werk vir Water: Suid-Afrika se baanbrekende program vir indringer-uitheemse spesiesbestuur	DMR	16 - 20 Oct	Mon 09:00	Die status van mariene inval wetenskap in SA	TBR
	Wed 12:00	Biologiese beheer van uitheemse indringerplante: Die Suid-Afrikaanse ervaring			Wed 12:00	Kriptisiteit in invalle	
	Thurs 08:00	Bestuur van boominvalle: Insigte uit die wêreldhoofstad van boominvalle			Thurs 08:00	Genetiese toepassings in 'n invalskonteks	
28 Aug - 1 Sep	Mon 09:00	Belangebotsings in die bestuur van indringer uitheemse spesies	DMR	23 - 27 Oct	Mon 09:00	Invalle in beskermde gebiede	TBR
	Wed 12:00	Uitheemse plantinvalle en uitsterwing van inheemse plante: 'n raamwerk met ses drempels			Wed 12:00	Die behoefte aan 'n interdisiplinêre benadering	
	Thurs 08:00	Inval sindrome			Thurs 08:00	Selfstudie	
4 - 8 Sep	Mon 09:00	Oorlogvoering as 'n sneller vir invalle	DMR				
	Wed 12:00	Stedelike inval-ekologie (Dr Luke Potgieter)					
	Thurs 08:00	Selfstudie					
Universiteitsreses: 11 - 15 Sep							

Practical programme:

The practical component of this course will take the form of various assignments that will be submitted online. Pracs are scheduled for Friday afternoons 14h00-17h00 in room 2020 of the Natural Sciences Building.

Please note that there is a **compulsory field trip on Saturday 19 Aug.**

Date	Topic	Venue	Lecturer
28 Jul	Introduction to the management report	2020	TBR
4 Aug	Textbook box	2020	TBR
11 Aug	Submission of textbook box. No formal prac.	SUNLearn	
18 Aug	No formal prac. Work on management report	N/A	
19 Aug	Field trip	TBC	DMR
25 Aug	No formal prac. Work on management report	N/A	
01 Sep	Class Test	2020	TBR
08 Sep	No formal prac. Submit management report by 17h00	SUNLearn	
University Recess 11 – 15 Sep			
22 Sep	No formal prac.	N/A	
29 Sep	Management report presentations Session 1	2020	TBR
6 Oct	Management report presentations Session 2	2020	TBR
13 Oct	No formal prac. Submit field trip report by 17h00	SUNLearn	
20 Oct	No formal prac.	N/A	
27 Oct	Q&A session re final test	2020	TBR

Praktiese program:

Die praktiese komponent van hierdie kursus sal die vorm aanneem van verskillende werkopdragte wat aanlyn ingedien word. Prakties is geskeduleer vir Vrydagmiddae 14h00-17h00 in kamer 2020 van die Natuurwetenskappegebou.

Neem asseblief kennis dat daar 'n **verpligte velduitstappie op Saterdag 19 Aug.**

Datum	Onderwerp	Lokaal	Dosent
28 Jul	Inleiding tot die bestuursverslag	2020	TBR
4 Aug	Hanboekboks	2020	TBR
11 Aug	Inhandiging van handboekboks. Geen formele praktyk nie.	SUNLearn	
18 Aug	Geen formele praktyk nie. Werk aan bestuursverslag	N/A	
19 Aug	Veldekskursie	MNBW	DMR
25 Aug	Geen formele praktyk nie. Werk aan bestuursverslag	N/A	
1 Sept	Klastoets	2020	TBR
08 Sept	Geen formele praktyk nie. Dien bestuursverslag in teen 17h00	SUNLearn	
Universiteitsvakansie 11 – 15 Sep			
22 Sept	Geen formele praktyk nie	N/A	
29 Sept	Aanbiedings van bestuursverslag Sessie 1	2020	TBR
6 Okt	Aanbiedings van bestuursverslag Sessie 2	2020	TBR
13 Okt	Geen formele praktyk nie, dien veldreisverslag in teen 17h00	SUNLearn	
20 Okt	Geen formele praktyk nie	N/A	
27 Okt	Vrae en antwoorde vir die laaste toets	2020	TBR