

## **BS in Biology (Pace University) and MSc in Ecology and Society (University for Peace) 3+2 Joint Degree Program**

### ***The University for Peace:***

The University for Peace (UPEACE) was established as a Treaty Organization with its own Charter in an International Agreement adopted by the General Assembly of the United Nations through its Resolution 35/55 of 5 December 1980. This unique history of UPEACE makes it the only University in the world created through a UN General Assembly Resolution with the specific mandate of *"engaging in teaching, research, post-graduate training and dissemination of knowledge fundamental to the full development of the human person and societies through the interdisciplinary study of all matters relating to peace."* As a result, it possesses a unique global legal authorization to grant Master's and Doctoral degrees as conferred upon it by the resolution that created it as well as by the International Agreement for the Establishment of UPEACE and the accompanying Charter annexed to Resolution 35/55.

According to the Charter of the UPEACE: *"The University is established with a clear determination to provide humanity with an international institution of higher education for peace and with the aim of promoting among all human beings the spirit of understanding, tolerance and peaceful coexistence, to stimulate cooperation among peoples and to help lessen obstacles and threats to world peace and progress, in keeping with the noble aspirations proclaimed in the Charter of the United Nations. To this end, the University shall contribute to the great universal task of educating for peace by engaging in teaching, research, post-graduate training and dissemination of knowledge fundamental to the full development of the human person and societies through the interdisciplinary study of all matters relating to peace."*

On the basis of this mandate, the University has developed a series of academic programs designed to fulfill the aforementioned objectives, and importantly, all programs are delivered in English. The contribution of the UPEACE is manifold: providing new generations with the knowledge and skills to influence processes of change in favor of peace within the United Nations system, within the framework of States in different parts of the world, local and global NGOs, and within a number of spaces that require increasingly more specific knowledge about how to address the tensions, threats, and conflicts present in today's international system. The UPEACE ensures its academic programs are in line with the fundamental pillars of the United Nations, and strives to maintain and continue its academic quality, in line with the newly established Sustainable Development Goals by way of its graduate degree programs in the Department of Environment and Development (DED), the Department of International Law, and the Department of Peace and Conflict Studies. The degree programs with the Department of Environment and Development include a MA in Environment, Development, and Peace, a MA in Responsible Management and Sustainable Economic Development, and now the MSc in Ecology and Society (operating since June 2022), the latter of which will be associated with the BS in Biology at Pace University by way of this proposed 3 + 2 BS/MSc model.

All Master's degree curricula within the DED at UPEACE have been vetted by the General Assembly of the UN and by the International Agreement for the Establishment of UPEACE and the accompanying Charter annexed to Resolution 35/55, verified by the International Association of Universities/UNESCO for its academic credentials and as having been developed by an educational institution that is recognized or sanctioned by a competent national authority, and also accredited by the National Higher Education Accreditation System of Costa Rica (SINAES) since 2013, guaranteeing the

quality of the program content and their relevance with regards to the mission of the University. The SINAES is equivalent to the various US Commissions on Higher Education.

### ***EXISTING PARTNERSHIP AGREEMENTS AT UPEACE AND PACE UNIVERSITY***

There are already a number of partnership agreements between the Pace University and other universities offering Pace BSc Biology students the opportunity to enter graduate or medical degree programs at other schools beginning in their 4<sup>th</sup> year. These include the 3+4 model Pace BSc Biology and Albany College of Pharmacy and Health Sciences Pharmacy Doctorate, the 3+2 model Pace BSc Biology and Columbia University Occupational Therapy graduate degree, the 3+4 Pace BSc Biology and NY College of Podiatry Doctor of Podiatry degree, and the Pace BSc Biology and SUNY Doctor of Optometry degree. There is already a Pace University – UPEACE dual degree program in place with the Pace University LLM in Environmental Law and the UPEACE MA in International Law and Human Rights. This is a 1-year program of 2 semesters (1 at Pace and 1 at UPEACE) in which Pace accepts 12 credits of graduate courses from UPEACE. Another partnership UPEACE has that is more of relevance to the proposed 3+2 proposal is the partnership between American University and UPEACE in which students receive the American University MA in International Affairs and the UPEACE MA in Natural Resources and Sustainable Development. In this case, American University accepts 8 of the UPEACE courses that are included in our 3+2 proposal as either Core courses or Elective courses into their accredited program. These courses are Research Methods (DED 6084), Sustainable Agriculture (DED 6022), Environmental Conflict and Sustainability (DED 6007), Coastal Resource Management (DED 6054), Forests, Forestry and Poverty (DED 6034), Climate Change Governance (DED 6037), Natural Resources Management (DED 6077) and Citizen Science (MAES 6005). As well, UPEACE also has a dual degree partnership with Brandeis University in which students receive equal credits from each university and receive the MA in Conflict Resolution and Coexistence from Brandeis and the MA in international Law and Human Rights from UPEACE. Given these partnerships and the acceptance of UPEACE graduate courses into the respective programs at these institutions, the tentative approval of this 3+2 model by Dyson College Senior Associate Dean for Academic Affairs Professor Richard Schlesinger, pending establishment and signing of an agreeable MOU between the two universities, and that 3+2 models between Pace and other universities do not need to go to the NYSED for approval, the acceptance of the UPEACE graduate courses for the 4<sup>th</sup> year of our BSc students is assured—again, once a MOU is signed between the two universities.

#### ***Description of the program:***

Students in this Joint Degree program will complete the BS in Biology at Pace University and the MSc in Ecology and Society (MSES) at the UPEACE in Ciudad Colón, Costa Rica in 5 years, again, with all UPEACE courses delivered in English, and English being one of the commonly spoken languages by all students at the university. The Program Objectives of this Joint Degree are to provide students the knowledge and skills to:

- a) Understand the multiple levels and components of ecosystems, the dynamic interactions between the various biotic and abiotic components that make up these ecosystems, how these components differ between various habitats to biomes, and how they are influenced by human interactions and disturbances;
- b) Combine these theoretical understandings with the ability to understand and conduct scientifically accurate and relevant experimental design and sample/data collection, and apply high-end critical thinking, quantitative and statistical analyses, resulting in the development and

application of successful and robust research experiences—all carefully linked to socio-cultural experiences, with the recognition of the strong connection between the ecological sciences and the various aspects of society;

- c) Develop into the next and future generation of ecosystem scientists with a deep understanding of the ecological theories and their applications to a complex society, with the capability and experience to conduct scientific research in the ecological sciences, and the knowledge, skills, and experience to apply these abilities to understand and address ecological issues that are currently occurring and will occur in the future, at the local, regional and international levels.
- d) Be successful in careers as Ecological scientists in the private, public and non-profit sectors, and to be successful applicants to future Ph.D. programs and professional schools

Students can apply for acceptance into this Joint Degree program when they are in the Fall semester of their Junior year of their BS degree program in Biology at Pace University. Upon acceptance, Pace University students will transfer to the MSc Ecology and Society program (MSES) at the UPEACE to begin taking their first courses in June as the program has a June start date. The 3+2 students during the 19 months of the program (June year 1 to December year 2) will take the same courses (32 credits) as the UPEACE direct entry students in the MSES program, as well as conduct their thesis research projects (9 credits). In addition, during this time frame, the 3+2 students will take an additional 6 credits of UPEACE MSc Ecology and Society electives to complete their Pace University BS Biology degree requirements. Upon completion of the Joint Degree program, the 3+2 students will have taken 102 Pace University credits and 26 UPEACE MSc credits towards the Pace BS Biology degree (total =128 credits), plus 21 additional credits towards the UPEACE MSc Ecology and Society degree. This results in a total of 149 credits for the Pace BS Biology degree and the UPEACE MSc Ecology and Society degree. The benefit of completing the joint program (versus both programs separately) is that students will be taking graduate courses and conducting research in their 4<sup>th</sup> and 5<sup>th</sup> years and graduating with a BS in Biology and a MSc in Ecology and Society in 5 years.

***Rationale for the Joint Degree:***

According to the [Bureau of Labor Statistics and Data USA](#) positions for ecological scientists trained at the MSc level are projected to increase in the US by about 2000 jobs per year between 2022 and 2030 ([US Bureau of Labor Statistics, Occupational Handbook](#)), at a rate of between 5-8%. Similarly, positions for ecological scientists in Canada are projected to increase by about 1000 jobs per year during this time period (Canadian Occupational Projections System). This 3+2 program involving the Pace BS Biology and UPEACE MSc in Ecology and Society degree programs is a unique opportunity that will help address this occupational need by implementing the above stated Program Objectives by providing a fast-track for life science students to be trained as Ecologists. The MSc component at UPEACE is a unique educational model of graduate level courses that make use of experiential learning and hands-on involvement with actual ecological situations, conditions and problems in various communities, field sites, a variety of forest types, and agricultural areas in Costa Rica. These along with the student Thesis research projects will provide the Pace and UPEACE students with real-life opportunities that apply theory, skills, and practice to their robust course and research experiences they've had at Pace and UPEACE. This 3+2 experience will combine to provide the students with a deep comprehension of the ecological theory and its application, and an understanding that the socio-cultural and other societal aspects of the human experience all interact intimately with ecosystems, their conditions, their services, and their health.

Individuals trained in this 3+2 BS and MSc degree program can pursue careers in the public, private, and non-profit sector at local, regional, national, and international levels as ecological scientists, foresters, conversation scientists, natural resource managers, wildlife managers, recreation managers, environmental assessment scientists, sustainability scientists, life science research technicians, ecological research technicians, environmental consultants, restoration ecologists, plant/soil ecologists or research technicians, naturalists, public school and college science educators, ecological journalism, and participants in government agencies associated with ecological policy development and implementation, and many other sectors.

In the BS degree in Biology at Pace University, students perform undergraduate research projects generally in one semester, however, this time frame often does not provide the necessary time to go deep enough into their project design, analyses and interpretations to result in a journal article publication—which is important for job placement, and Ph.D. or professional school program applications. This Joint Degree program will enable students to spend at least 6 months full time conducting their research with a UPEACE and other international scientist-mentor to give them time to fully complete their thesis research projects and submit an article for publication. For this Joint Degree program, it is a stated goal that each MSc graduate in Ecology and Society will complete a research project of the quality that they will submit their research for publication. This is a critical core outcome of this 3+2 degree program.

***Student Demand for a 3+2 Joint Degree Program In Ecology:***

Pace University currently does not have an Ecology degree program, and as such is not likely seen as a “go to” institution for high school students or community college transfers who are interested in Ecology as a discipline of study and future career. This 3+2 partnership would provide excellent material for targeted recruitment of students with an interest in this area. The regional post-secondary data from Data USA show there is certainly a very strong student interest in Ecology in the localized area near Pace University. These data indicate that the highest concentration and greatest number of undergraduate degrees in the ecology-related degree programs in [Ecology](#), and [Ecology & Evolutionary Biology](#), and [Ecology, Evolution, Systematics & Population Biology](#) are from universities in New York City and the closely adjacent areas in New Jersey (within about 50 miles or less from Pace University’s Manhattan campus). In fact, the most recent of these data (2020) indicate that 811 of the ~10,000 students graduating with such baccalaureate degrees across the US received their degrees from the 11 universities in these New York City and adjacent New Jersey areas that offer BS degrees in 1 of these 3 areas of Ecology (see Table 1, and the section below on Similar Local Programs). There is also a strong interest in Master’s level degree education in the region as 6 of these same universities, and Fordham University, offer MS degrees in Ecology. In short, the region in and around Pace University is a literal “hotbed” of student interest in Ecology baccalaureate degrees, and there is still a need for more Master’s level degrees. As well, even though Pace University does not have a history of offering an Ecology BS degree, there is a small amount of evidence for supporting this 3+2 proposal in that over the past 3 ½ years, there have been 11 students enrolled in the Pace Biology Departments Ecology Minor, and as of February, 2023, there are 3 former Pace University bachelor’s degree graduates that are finishing their first year in or about to begin the MSc in Ecology and Society at UPEACE in Costa Rica.

***Anticipated Enrollments:***

The UPEACE MSc in Ecology and Society has been operating since June 2022 with its’ first cohort. One Pace University BSc graduate is in that cohort as a result of only brief discussions in several classes and

an email that went to our students about the new MSc degree. The second cohort begins at UPEACE in June 2023 and there are 2 Pace University BSc students in that program, again as a result of brief discussions in classes and an email. Given that there have been 3 students in 2 years attracted to this program even after they graduated with a BSc and with minimal advertising, we believe this 3+2 program will provide a successful marketing opportunity to recruit new students into the Pace Biology degree program for this 3+2 opportunity, as well as recruiting existing students into it as well. This positive outlook is based on several components described below:

- 1) There appears to be a demand for programs in the ecological sciences in our regions, and at Pace University, as indicated in the previous section on Student Demand.
- 2) The cost of the MSc program at UPEACE is very affordable for Pace students as we are a partner institution, which provides a significant discount, as well there is a very generous merit-based discount that most BSc Biology students would receive (based on gpa), all resulting in a cost for the 3+2 for Pace students of about \$6,650 to \$9,310, depending on level of merit-based discount, for the first year, and about ½ of that for the final 4-6 months for their research and thesis writing.
- 3) The variety of tropical field sites, as well as the opportunity to conduct research with tropical ecologists living in Costa Rica is likely to be a great draw for students interested in the ecological sciences as the country is already known as a destination country for ecological studies.
- 4) The cost of living is extremely low in Costa Rica, especially compared to NYC, which when combined with the relatively low tuition makes this 3+2 BSc/MSc program very attractive for students interested in the ecological sciences.
- 5) As all courses and research experiences are taught in English, language is not a barrier for students to pursue this international experience, as is not often the case.
- 6) The time savings resulting from the students receiving a BS and a MSc in about 5 years is attractive.
- 7) The intangible benefit here is the opportunity to be connected to a United Nations-linked MSc degree. This is difficult to assess, but this connection, and students connecting with other students from around the world at UPEACE certainly enhances student networking and job opportunities.

As a result of these 7 components and implementation of the recruitment plan described below, we expect enrollments to increase as follows:

- Beginning in Fall 2023, due to targeting recruiting of high school and community college students in the region who are interested in ecology, international experiences, and the opportunity to receive 2 degrees in about 5 years, we expect to have 4 new students interested in ecology enroll at Pace per year
- AY 2024/2025: we expect 3 existing Pace BSc Biology students in their 4<sup>th</sup> year to enter the MSc at UPEACE in June 2024.
- From AY 2025/2026 and beyond, we expect to recruit about 7-10 new students to the Pace University Biology BSc program each year, and send 5-7 BSc Biology students in their 4<sup>th</sup> year to the MSc program at UPEACE.

#### ***Plan For Student Recruitment:***

There are several groups we expect to successfully recruit from to enroll into this 3+2 program. First, we expect to target students who are already enrolled in the BS in Biology at Pace University with an interest in Ecology. By providing these students with an opportunity to enroll in a MSc program in Ecology and Society in their senior year, live in Costa Rica for 2 years, complete both a BS and MSc degree in a total of 5 years, and generate scientific research article publications, we are more likely to retain such students at Pace rather than have them leave to find undergraduate degree programs in Ecology elsewhere. Second, we feel like this is a good program for Pace Biology students who are not

sure what to do with a Biology degree, or who might be thinking about a PhD, MD or DVM degree, but are not ready yet for that. Thus, these would choose this option to get two degrees in 5 years in preparation for acceptance into professional schools or PhD programs. Lastly, however, the ultimate new target for us is to recruit new potential students from area high schools and community colleges that have an interest in Ecology but would not have previously chosen to attend Pace University due to its lack of an Ecology curriculum. We strongly feel that this initiative is likely to add new enrollments in the Pace University science programs that would not have previously come to Pace, based on the data mentioned above describing the great interest in Ecology-related sciences in the immediate region, the economic advantages of this program, and the draw of spending time in Costa Rica make this 3+2 option a relatively easy sell. Combining this with the amazing opportunity for students to be attending university school at a UN-sanctioned and created graduate school makes this a very marketable proposal.

***Similar Local Ecology Programs in New York and New Jersey:***

There are 11 universities in the New York and New Jersey area that offer BA or BS degrees in Ecology, Environmental Biology or Biology with Ecology tracks and 6 of these also offer Master's level degrees in these disciplines (See Table 1). Fordham University offers no such baccalaureate program, but does offer a MS in Biological Sciences, Ecology track. Two of the universities offer accelerated combined BS/MS or BA/MA degree programs in Ecology or Ecology track programs, however, there are no programs in which the BS Biology and MS in Ecology are combined between different universities and, in particular, none are associated with a university in another country, and certainly not one associated with any UN educational initiatives. There are only a few who offer any type of summer research experiences in other countries. The extensive number of students in the immediate region receiving bachelor's degrees, and the more limited number of institutions offering MS degrees in Ecology, suggest that a 3+2

Academic Institution NYC & NJ)	Bachelor's Level Ecology and Related Degrees	Master's Level Ecology and Related Degrees
Barnard College	BS Biology, Ecology & Evolutionary Biology Track	none
Columbia University	BS Environmental Biology	MA Ecology, Evolution & Conservation Biology
CUNY-Lehman College	BS Environmental Science, Ecology Track	none
Fordham University	none	MS Biological Sciences, Ecology track (also has combined BS/MS Biology and Ecology Track)
Hofstra University	BA/BS Urban Ecology	MA/MS Urban Ecology (has combined BA/MA and BS/MS Urban Ecology
Iona University	BS Biology, Ecology and Environmental Biology track	none
NY University	BS Biology, Ecology Track	none
SUNY New York City	BA Environmental Biology, BA Forest Ecosystem Science	MS Environmental Biology, Ecology and Evolution track
SUNY Stonybrook	BA Ecosystems and Human Impacts	MS Ecology and Evolution
Montclair State University, NJ	BS Biology, Ecology and Evolution track	MS Biology, Ecology and Evolution track
Princeton University, NJ	BS Ecology and Evolutionary Biology	none
Rutgers University, NJ	BS Ecology, Evolution, and Natural Resources	MS Ecology and Evolution

Table 1. Academic Institutions in NY City and adjacent areas of New Jersey with Bachelor's and/or Master's level degree programs in Ecology and Ecology-related areas. Includes schools with a combined Bachelors/Masters program.

BS Biology and MSc Ecology and Society degree program would be of interest to students. We feel this to be even more true given the biodiversity and ecological sciences draw of Costa Rica, and the opportunity to be associated with an international UN educational-linked graduate school, all providing a truly unique model and experience for students interested in Ecology.

***Categories of Positions For Employment of Graduates:***

Individuals trained in this 3+2 BS and MSc degree program can pursue careers in the public, private, and non-profit sector at local, regional, national, and international levels as ecological scientists, foresters, conversation scientists, natural resource managers, wildlife managers, recreation managers, environmental assessment scientists, sustainability scientists, life science research technicians, ecological research technicians, environmental consultants, restoration ecologists, plant/soil ecologists or research technicians, naturalists, public school and college science educators, ecological journalism, and participants in government agencies associated with ecological policy development and implementation, and many other sectors.

***Enrollment management:***

The joint program is intended to attract students to Pace who show enthusiasm for careers in Ecology who would not have come to Pace University prior to implementation of this 3 + 2 program opportunity in order to get international experience and graduate level education in Ecology and Society. We also hope to increase the enrollment of students with high scholarly aptitude for the ecological sciences in both the BS in Biology and the MSc Ecology and Society programs. Because we have large lecture classes divided into multiple small laboratory sections in the BS Biology major core courses, adding additional students in the lectures is not an enrollment management issue, and we welcome the addition of more students in the major. The MSc graduate courses in Ecology and Society will be typically capped at 20 students to ensure student-faculty interaction. Thus, we hope to increase enrollment in the Pace Biology component of the 3+2 only up to a limit of students we can send to UPEACE. As we increase our applicant pool, we will be able to become more selective in terms of the students we accept. It is therefore our intent to enhance the reputation of both the Pace Biology BS degree component and the UPEACE Ecology and Society MSc degree program by attracting higher caliber students who will excel in the both the programs and the future workforce. We will do so by working with the two respective recruitment offices to help generate targeted recruitment strategies.

***Budget and additional resources:***

As the BS Biology degree program already exists at Pace University, and students in this 3+2 program would be taking the first 3 years of course work in the program that already exist, there would be no additional funds required to hire faculty or create new courses. If enrollment increases significantly in the Pace Biology component of the 3+2 program, additional funds could be required for Adjunct salary costs for sections of courses in the 3 years of the program at Pace, however, these funds would be based on our typical cost-recovery model in which Adjuncts are only hired for sections they are needed in. We believe it is more likely that there will soon be an actual increase in annual student FTE funds based on increased enrollment of more fulltime students in the Biology program as a result of recruiting efforts for this program. As such, we expect that the revenue from new fulltime students is expected to off-set any Adjunct costs and therefore there are only positive budget implications.

***Anticipated start date:***

Students are already in the MSc in Ecology and Society at UPEACE, and thus, once approved, we expect BS in Biology junior students to apply for acceptance into the joint program for entry in the June 2023 cohort.

***Overview of curriculum:***

The next 3 pages contain the proposed Guide sheet for the joint degree program, the MSc Ecology and Society Core courses electives, and Table 1 for the comparable Ecology-related BS and MS degree programs in the NYC-NJ region. The Pace BS Biology portion of this 3+2 program will include the following credits from the UPEACE MSc Ecology and Society program:

- 17 credits (6 courses) of UPEACE MSc program Core Courses are in the student's 4<sup>th</sup> year
- 6 credits (2 courses) of UPEACE MSc program electives are in student's 5<sup>th</sup> year
- 3 of the 9 MSc Research Thesis credits will replace the BIO 480 Pace 3 credit requirement.

This brings the Pace BS Biology degree total to 128 credits, and the combined 3+2 Pace BS Biology and UPEACE MSc Ecology and Society to 149 credits.

<b>MSc Ecology and Society UPeace Core Courses (41 cr.)</b>	
<b>Credits</b>	
Graduate Ecology	3
Ecology and Society	3
Graduate Statistics	3
Research Methods	3
Community Ecology	3
Forests, Forestry, & Poverty	3
Tropical Ecosystem Assessment	3
Current Topics in Ecology	2
Thesis Research	9
U PEACE Electives	9
<b>Total = 41</b>	
<b>U PEACE Graduate Course Electives</b>	
Ecosystem Ecology	3
Evolutionary Ecology	3
Bird Ecology	3
Plant Ecology	3
Ethnobotany	3
Natural Resource Management	3
Environment, Conflicts and Sustainability	3
Sustainable Agriculture	3
Climate Change Governance	3
*41 cr for U PEACE MSc in Ecology and Society	
* 3+2 Pace BS = 102 Pace BS credits + 26 UPEACE MSc credits = 128 total credits	
* Total = 128 Pace BS + 21 additional U PEACE MSc credits = 149 credits	

BACHELOR OF SCIENCE / BIOLOGY MAJOR (NYC) PLUS MSc IN ECOLOGY AND SOCIETY (UPEACE)			
<b>UNIVERSITY CORE (min. 51 cr. required)</b>		<b>PACE BS MAJOR COURSES</b>	
<b>Foundation Requirements 21-31 cr.)</b>		<b>Biology Requirements (31 cr.)</b>	
ENG 110 (can test out)	cr # 0-3 ✓	BIO 101: General Biology I	cr # 4 ✓
ENG 120 Critical Writing	4	BIO 102: General Biology II	4
ENG 201 Writing in the Disciplines	3	BIO210: Ecology	4
COM 200 Public Speaking	3	BIO 231: Genetics	4
MAT 131: Calculus I	4	BIO 327: Cellular Biochemistry	4
CHE 111: General Chemistry	4	BIO 335/335A: Molecular and Cellular BIO	5
CIS 101, CIS 103, CIT 110, CS 121, TS 105	3-4	BIO 490: Intro to Research	3
<b>Second Language Proficiency (can test out)</b>		BIO 493 Major Field Test in Biology	0
Two Language courses* selected from:		MSc Thesis Research (3 of 9 cr for Pace degree)	3
ARA/ASL/CHI/FRE/ITA/JPN/POR/RUS/SPA			
*See second language placement policy			
(can test out)	0-3	<b>MSc Ecology and Society UPEACE Core Credits (17 cr.)</b>	
(can test out)	0-3	Taken in 4th and 5th years in UPEACE MSc Degree	
<b>Total Foundation Credits= 21-31</b>		MAES 6000 Graduate Ecology	3
<b>Areas of Knowledge (AOK)</b>		MAES 6001 Ecology and Society	3
See web class schedule for list of approved courses		MAES 6003 Graduate Statistics	3
<b>Western Heritage - WH</b>	cr # 3 ✓	MAES 6002 Community Ecology	3
1 course (formerly AOK 2)		MAES 6004 Ecological Research Methods	2
<b>World Cultures &amp; Traditions - WCT</b>	3	DED 6034 Forests, Forestry, and Poverty	3
1 course (formerly AOK 3)		<b>Pace BS Biology Required Math &amp; Science Courses (8 cr.):</b>	
<b>Humanistic &amp; Creative Expressions - HCE</b>	3	CHE 112: General Chemistry II (in core)	0
1 course (formerly AOK 4)		CHE 223: Organic Chemistry I (in core)	0
<b>Analysis of Human, Social &amp; Natural Phenomena - HSN</b>	3	CHE 224: Organic Chemistry II (in core)	0
1 course (formerly AOK 5)		MAT 141: Statistics for Life Sciences (core)	0
MAT 141: Statistics	4	PHY 111 or PHY 101 : Physics I	4
<b>ONE additional course from WH, WCT, HCE, or HSN</b>	3	PHY 112 or PHY102: Physics II	4
<b>In Depth Sequence (14 cr.)</b>		<b>Pace BS Biology Majors Elective</b>	4
CHE 112: General Chemistry II	4	<b>U PEACE MSc Electives (6 cr)</b>	
CHE 223: Organic Chemistry I	5	*Taken in the 4th or 5th year	
CHE 224: Organic Chemistry II	5	2 electives from the U PEACE list of electives	6
<b>Required Learning Experiences:</b>		<b>Total Major Credits= 66</b>	
1 Learning Community = LC (2 linked courses) or INT Course		<b>OPEN ELECTIVES</b>	cr # ✓
1 Civic Engagement / Public Values = CE (formerly AOK 1)		Range of credits reflects variations in a student's Univ. Core (i.e., testing out 0-9 cr. and/or choosing up to three 3-cr. courses, instead of 4 cr., in foundation requirements).	
2 Writing Enhanced Courses = WEC		UNV 101	1
BIO 490		<b>Total Pace Biology BS Credits</b>	128
		<b>Additional MSC Ecology and Society Courses (21 cr)</b>	
		*Taken in 4th and 5th years at UPEACE	21
		<b>Total Degree Credits (min. of 147*)= 149</b>	
		(Core + Major + GRAD + Elective)	

All Can Be Satisfied by Core, Major, or Open Electives

**Total Core Credits (min. of 44\*)= 51-61**

**Example Timeline of Curriculum for the 3+2 Pace BS Biology/U PEACE MSc Ecology and Society :**

<b>YEAR 1</b>	
<b>FALL</b>	<b>SPRING</b>
BIO101 <i>Introductory Biology I</i> (4 credits) CHE111 <i>General Chemistry I</i> (4 credits) 8-10 credits of university core or open electives	BIO102 <i>Introductory Biology II</i> (4 credits) CHE112 <i>General Chemistry II</i> (4 credits) 8-10 credits of university core or open electives
<b>YEAR 2</b>	
<b>FALL</b>	<b>SPRING</b>
BIO231 <i>Genetics</i> (4 credits) CHE223 <i>Organic Chemistry I</i> (5 credits) BIO210 <i>Ecology</i> (4 credits) 3-4 credits of university core or open electives	BIO335 <i>Cellular &amp; Molecular Biology</i> (5 credits) CHE224 <i>Organic Chemistry I</i> (5 credits) 3-6 credits of university core or open electives
<b>YEAR 3</b>	
<b>FALL</b>	<b>SPRING</b>
BIO327 <i>Cellular Biochemistry</i> (4 credits) PHY101 <i>Physics I</i> (4 credits) 8-9 credits of university core or open electives	BIO490 <i>Introduction to Research</i> (3 credits) BIO elective with a lab (4 credits) PHY102 <i>Physics II</i> (4 credits) BIO 493 (MFT Exam) 4-5 credits of university core or open electives
<b>YEAR 4 AT U PEACE</b>	
<b>SUMMER FULL SEMESTER</b>	<b>FALL FULL SEMESTER</b>
MAES 6000 <i>Graduate Ecology</i> (3 credits) MAES 6001 <i>Ecology and Society</i> (3 credits) MAES 6002 <i>Community Ecology</i> (3 credits) MAES 6003 <i>Graduate Statistics</i> (3 credits)	MAES 6004 <i>Ecological Research Methods</i> (2 credits) DED 6034 <i>Forests, Forestry, and Poverty</i> (3 credits) 6 credits of U PEACE MSc electives
<b>YEAR 5</b>	
<b>WINTER FULL SEMESTER</b>	<b>SUMMER AND FALL</b>
MAES 6006 <i>Tropical Ecosystem Assessment</i> (3 credits) 6 credits U PEACE MSc electives 3 credits U PEACE Research	6 credits U PEACE Research 6 credits U PEACE MSc electives Thesis submission and defense December

**Total combined degree credits = 149**

**Pace BS Biology credits = 102 + 26 MSc credits =128**

**Remaining U PEACE MSc credits = 21 credits for a combined total = 149**