FEDERAL UNIVERSITY OF PERNAMBUCO

DEAN OF RESEARCH ERNANI RODRIGUES DE CARVALHO NETO

DIAGNOSTICS

Strenghts

Title

There are many instances of successful international cooperation predominantly among European and American institutions.

Justification

According to analysis of the Scival database (period from the beginning of 2014 to March / 2018), UFPE maintained collaborations in this period, through co-authored publications, with 1444 institutions, 567 of which are located in Europe and 309 in the USA. This broad cooperation allows for a detailed evaluation of successful relationships (high volume of production with a high impact factor in the area of knowledge - FWCI) between institutions that will base internal selection decisions on sub-proposals. This analysis looks at successful relationships (FWCI ≥ 1.0 and number of articles ≥ 50) with partner institutions in Austria, Belgium, Denmark, Spain, France, the Netherlands, Portugal, the United Kingdom, and Sweden in Europe, Argentina, Chile, Colombia and Mexico in Latin America, institutions in Canada and the USA in North America, with institutions in China, India, and Japan in Asia, and with institutions in Australia.

Title

Potential of highly qualified teachers / researchers

Justification

UFPE counts on almost 350 scholarship recipients in the area of Technological Development (DT) and Productivity (Pq) of the CNPq. As far as scholarships are concerned, almost half of them are level 1, which indicates the qualification and experience of the teaching staff. In some areas of the CNPq, the number of Pq scholarship recipents reaches values between 5 and 10% of the total national scholarships. In recent years, UFPE has been stimulating an increase in the quality of intellectual production through a system of public notices that base selections on academic merit, and the results have been largely satisfactory. An evaluation of the production of scientific articles with participation of UFPE professors in the Scival database indicates the UFPE holds 11th place among Higher Education Institutions (HEIs), highlighting its potential. It should be emphasized that this potential is the reflection of consolidated research groups of high quality / international impact even without the participation of foreign collaborators (the second most cited article published between early 2014 and March 2018 was authored only by scholars from UFPE, and of the 21 articles in this period that obtained more than 50 citations, eight were not the product of international collaboration). Some areas of knowledge have a large part of their production (more than 50%) reaching FWCI values above 1.0. (e.g., "Ecology" and "Ecology, Evolution, Behavior and Systematics") and Exact, Technological and Multidisciplinary Sciences (e.g., "Computer Sciences," "Decision Sciences," and Mathematics”).

Title

Existence of Post-graduate Programs reaching levels of excellence**.**

Justification

As a result of CAPES 2017 Quadrennial Evaluation, UFPE becomes part of an elite set of Higher Education Institutions (HEIs) with a program rating of 7, indicating a program of excellence with a high level of internationalization. In the areas of Computer Science and Engineering III, UFPE stands out as the only HEI outside the Southeast-South axis to obtain a grade of 7 (PGPs in Computer Science and Production Engineering). In the area of Biodiversity, UFPE also stands out, with PGPs in Animal Biology and Plant Biology—it is the only one of the 5 HEIs in the country that has had more than one PGP evaluated with a score of 6 or 7 outside the Southeast region of Brazil. UFPE is also the only HEI in the North and Northeast to have a PGP rating of 6 in Political Science and International Relations and in Sociology. The Chemistry and Social Work PGPs add to UFPE's Programs of Excellence, with courses rated 6 or 7, as a standard. UFPE enjoys national recognition in such a way as to qualify it to pursue the PrInt call for resources to expand its degree of internationalization.

Weaknesses

Title

Regional socioeconomic structure and reduction of foreign language subjects in undergraduate and postgraduate studies.

Justification

Regional and intra-regional asymmetries are recognized and relevant to various socioeconomic aspects. Despite recent advances, particularly at the higher level of federal government efforts, these asymmetries increase the effort required to obtain more impactful results (for example, in the expansion of subjects taught in other languages). A study coordinated by Marcelo C Neri, from the Getúlio Vargas Foundation, indicates that Recife, among the capitals of the Brazilian states, ranks 21st among 27 in average schooling / years of study, behind, among others, all capitals of the states of the Southeast-South (SE-S) of the country. This study highlights that Recife ranks 7th in study-time inequality, which increases the degree of difficulty. The same pattern can be observed with regard to per capita income (Recife taking 17th place [again behind all SE-S capitals] and taking the 1st position in income inequality). An aggravating factor of this aspect is the low number of UFPE's foreign teachers (the second lowest among the 16 Brazilian HEIs best evaluated in the QS 2018 ranking of Latin American Universities).

Title

Incipient institutional structure to serve a larger network of international collaborations.

Justification

UFPE has an extensive network of international collaborating institutions; however, the volume of collaborative production with the participation of researchers from international institutions is slightly below the Brazilian average (29.1% versus 30.7% of the total production indexed in Scival between early 2014 and March 2018). This is reflected by an FWCI value also slightly below the national average (0.82 vs. 0.88). It is noted that international cooperation clearly leverages the impact of production (FWCI values between 0.56 and 0.68 for production in institutional or national collaboration, versus 1.25 for production with international collaborators). The recent (2012) expansion of the International Relations Board (which until 2011 was a Coordinating Committee with more limited functions) should act as a facilitator throughout the implementation of PrInt in the coming years. There is a need to expand the number of technical and administrative staff able to deal with foreign audiences, as well as to implement an appropriate reception infrastructure ("home of the researcher") of foreign visitors.

Do you have a well defined institutional vocation?

No

Provide other relevant Information on the level of internationalization of your institution

UFPE has participated in institutional missions organized by the Brazilian Government (MEC / MRE, Capes / CNPQ) and by foreign partners, to disseminate competencies, participate in projects and programs, and work with partners to collaborate cooperatively among institutions. Among the recent projects that UFPE has participated in, which are processed by DRI, are: Projects with the European Erasmus community: a) Be Mundus, Erasmus + and Sustain T Project, involving academic mobility (students, teachers, and staff) in a partnership with several foreign universities, among them: University of Porto, New University of Lisbon, Ecole Centrale De Lille, Ecole Centrale De Nantes, Karlsruhe Institute of Technology, Università degli Studi di Roma, Pontificia Universidad Catolica del Peru, Pontificia Universidad Javeriana, University Politecnica De Madrid, Vrije Universiteit Brussel, National University of Colombia, Cardi ff Metropolitan University; b) Project LISTO - involving the development of capacities with contributions from foreign universities in the areas of innovation and entrepreneurship: Uppsala Universitet, University of Valladolid, National University of the Coast, National University of Cordoba, and Universidad Católica del Uruguay. Projects with North American Institutions a) 100K Strongest in America funded project involving teams of researchers from the following universities: University of Arizona, Catholic University of Chile; b) COIL Project - in partnership with State University of New York - SUNY, teacher training for the progressive deployment of virtual mobility components in undergraduate curriculum. Participation as members in international higher education networks: Grupo Tordesillas, Coimbra Group, AULP, FORGES, UDUAL, AUF, FAUBAI, OUI, and Universia. Participation of UFPE in international events and fairs: EAIE (Europe), NAFSA (USA), IEASA (South Africa), Tordesillas Group, GCUB, AULP, FORGES, UDUAL, AUF, FAUBAI, and Universia. Representations assumed by UFPE in national and international networks. By the Administration: a) President of CRIA / ANDIFES - in force; b) Regional President of Latin America at CRULA - AUF - in force; President of the Tordesillas Group; d) Director of GCUB e) Director of Forges. For the Director of International Relations: a) vice president of FAUBAI; b) President of Faubai - biennium 2018-2020; c) Secretariat of the CGRIFES / Andifes.

INSTITUTIONAL PROJECT REGISTRATION - PII

Institution of the Project Coordinator
FEDERAL UNIVERSITY OF PERNAMBUCO

General Objective

UFPE is based at a country marked by regional and intraregional asymmetries and deep social inequalities. The Northeast is undoubtedly an example of these differences. A recent study by the Getúlio Vargas Foundation indicates that among the capitals of the Brazilian states, Recife occupies the 21st (among 27) position in average schooling / years of study, behind, among others, all the capitals of the Southeast-South states of the country. This study highlights that Recife ranks 7th place in study-time inequality, increasing the degree of difficulty. The same pattern can be observed with respect to per capita income (Recife takes the seventeenth position [again behind all SE-S capitals]). Recife also ranks first in income inequality. Such conditions would present an added challenge to any internationalization project developed in this region, serving as discouragement and weighing down the project with a sense of futility. Or it may have just the opposite effect; it can inspire a sea change or a search for answers that can be found in UFPE's performance in the area of research and post-graduate studies. As a result of the 2017 CAPES Quadrennial Evaluation, UFPE becomes part of an elite set of Higher Education Institutions (HEIs) with a Programs rating of 7, indicating a program of excellence with a high level of internationalization. In the areas of Computer Science and Engineering III, UFPE stands out as the only HEI outside the Southeast-South axis to obtain a grade of 7 (Post-Graduate Programs [PGP] in Computer Science and Production Engineering). In the area of Biodiversity, UFPE also stands out, with PGPs in Animal Biology and Plant Biology. It is the only one of the 5 HEIs in the country to have more than one PGP evaluated with a grade of 6 or 7 outside the Southeast region of Brazil. UFPE is also the only HEI in the North and Northeast to have a PGP rating of 6 in Political Science and International Relations and in Sociology. The Chemistry and Social Work PGPs are also part of UFPE's Programs of Excellence, with ratings of 6 or 7. Thus, UFPE has garnered the national and international recognition in strategic areas necessary to fuel efforts to change its environment. UFPE counts on almost 350 scholars participating in scholarship programs such as Productivity (Pq) and Technological Development (DT) of the CNPq. As far as scholarships are concerned, almost half are level 1, which indicates the qualifications and experience of the teaching staff working in the region. In some areas of the CNPq, the number of Pq scholarship recipients reaches values between 5 and 10% of the national scholarship total. An evaluation of the production of scientific articles with participation of UFPE professors in the Scival database indicates the UFPE holds 11th place among the Brazilian HEIs, highlighting its potential. At the international level, with a view to collaborative publications and according to the analysis of the Scival database (period from 2014 to March 2018), UFPE maintained collaborations on joint publications with 1444 institutions, 567 of which are located in Europe and 309 in the USA. This extensive cooperation allows for a detailed evaluation of successful relationships (high volume of production with a high impact factor weighted by FWCI) between institutions that will base internal selection decisions on sub-proposals. In this analysis, successful relationships (FWCI≥1.0 and number of articles ≥ 50) include those with partner institutions in: Germany, Austria, Belgium, Denmark, Spain, France, the Netherlands, Portugal, the United Kingdom and Sweden in Europe; institutions in Argentina, Chile, Colombia and Mexico in Latin America; institutions in Canada and USA in North America; institutions in China, India and Japan in Asia; and institutions in Australia. In the context of the consolidation of international partnerships, it is important to note that UFPE already has a high number of collaborations (one third of a total of 2510 recent publications (2017/18) in the Scopus database consists of works resulting from international collaboration). In spite of the asymmetries of investment in science and technology in Brazil, UFPE has sought to enter the global field using its own resources and with a focus on internationalization. In recent years, more than half of the teachers contracted as visiting lecturers came from countries in Europe and the United States. Since 2014, the University has hired 23 foreign teachers (USA, UK, France, Holland, Germany, Israel, Mexico, Portugal, Spain, Colombia, Switzerland, Denmark, South Africa), and invested approximately R $ 6,000,000.00 (six million reais) in this effort in the last 4 years. In the same sense, UFPE has already structured the Languages Center - NUCLI, linked to the International Relations Board, which offers classes in English, Spanish, French, Italian, and also Portuguese to Brazilians and foreigners with various types of support (MEC, Embassies of France and Italy). The modules are offered to the entire academic community (students, teachers, researchers, and administrative technicians) and the process of enrollment, leveling, and placement in classes is done through the MEC portal. At the national level, UFPE has several development programs that complement the internationalization effort. In particular, we can mention the eight National Institutes of Science and Technology - INCTs under the leadership of UFPE, which aggregates all the institutes of this nature in the State of Pernambuco. These Institutes are funded by CNPq and FACEPE. They include: Software Engineering, Photonics, Flora and Fungi Herbarium, Information and Decision Systems, Pharmaceutical Innovation, National Observatory of Water and Carbon Dynamics in the Caatinga Biome, Ethnobiology, Bioprespection and Nature Conservation, and Nanotechnology for Integrated Markers. All these institutes have consolidated internationalization channels and conduct their research at the national level. The internationalization approach adopted by UFPE is aligned with the 17 global objectives to achieve sustainable development outlined by the United Nations Agenda in 2016. The criterion of sustainable development, along with other indicators, has been used to select the priority themes of the PrInt-UFPE proposal: Biodiversity and Conservation of Natural Resources, which is aligned with sustainable development objectives (ODS) 06, 12, 13, 14 and 15 of the UN 2030 agenda; Innovation in Basic Sciences associated with ODS 07 and 09; State and Society in global contemporaneity: dynamics of inequality and development, theme associated with ODS 01, 05, 08, 10, 16 and 17; Health Innovation focused on ODS 03; and Systems Modeling, a topic that adheres to ODS 09, 11, and 12. https://nacoesunidas.org/pos2015/agenda2030/. PrInt-UFPE is also aligned with the following objectives: it seeks to incorporate international and intercultural dimensions into the university environment, broadening and strengthening its dialogue, knowledge, and cultural exchange with the world, which will bring obvious benefits to the process of quality education for all; aims to increase the capacity of international communication through the insertion of foreign languages among the courses and other activities at UFPE; aims to increase international visibility, particularly high-quality post-graduate teaching and research activities; and aims to broaden the qualification of knowledge production and research conducted at UFPE, promoting partnerships and connections through strategic international networks. The five strategic axes of the UFPE Internationalization Plan, namely University Mobility, Internationalization of Graduate, Post-Graduate Research, Extension and Innovation, Internationalization at Home, Institutional Missions and Participation in Networks, and Capacity Development, correspond with the activities to be developed at PrInt-UFPE, mainly in relation to building new partnerships and developing collaborative projects, promoting UFPE among foreign students and teachers, appropriating knowledge obtained abroad, and creating new knowledge based on international exchange. All these objectives can be combined toward UFPE's internationalization of its higher education programs and research, which will be established as a vector for changes and improvements in the training of qualified human resources and production of knowledge.

SPECIFIC THEMES AND OBJECTIVES OF THE PROJECT

Theme	Partner countries
BIODIVERSITY AND CONSERVATION OF NATURAL RESOURCES	Uruguay; Belgium; Australia; Netherlands; Spain; Germany; Chile; Italy; Mexico; Canada; Poland; Portugal; United Kingdom; Argentina; Austria; Colombia; United States; France;

Justification

THE THEME IS ORGANIZED AROUND THE THREE MAIN AXES OF THE MODERN SCIENCE OF BIODIVERSITY (CHARACTERIZATION, USE, AND CONSERVATION). THESE AXES ARE PART OF THE GLOBAL AGENDA DEFINED BY MAJOR INTERNATIONAL FUNDERS, SUCH AS THE WORLD BANK AND GLOBAL ENVIRONMENTAL FUND (GEF) FOR STUDIES OF BIOLOGICAL DIVERSITY. AS A COUNTRY THAT HOLDS A SIGNIFICANT SHARE OF THE WORLD 'S BIODIVERSITY, LAYING CLAIM TO IMPORTANT CONSERVATION ZONES, BRAZIL AND ITS RESEARCH ON TROPICAL BIODIVERSITY HAVE RELEVANCE AND AN INTERNATIONAL IMPACT, THIS BEING A KEY THEME FOR THE INTERNATIONALIZATION OF BRAZILIAN SCIENCE AND OF UFPE. IT SHOULD BE NOTED THAT THE CONSERVATION OF NATURAL RESOURCES AND THE MINIMIZATION OF ENVIRONMENTAL DAMAGE DUE TO HUMAN ACTIVITIES ARE FULLY ALIGNED WITH THE SUSTAINABLE DEVELOPMENT OBJECTIVES (ODS) 12, 13, AND 14 OF THE UNITED NATIONS (UN) AGENDA 2030. THE CHOICE OF THE THEME BY UFPE IS JUSTIFIED BY THE PROMINENT PRODUCTION AND HIGH INTERNATIONAL IMPACT THAT HAS BEEN ACHIEVED IN SCHOLARSHIP ON SAID THEME (OF THE 180 ARTICLES WITH THE HIGHEST NUMBER OF UFPE CITATIONS IN THE LAST 4 YEARS, 45 ARE IN THIS AREA OF KNOWLEDGE, SCIVAL) AND ALSO BY HIGHLY QUALIFIED SCHOLARS (21 FELLOWS AT LEVEL 1 AND 12 AT LEVEL 2) AND PROGRAM RATINGS (TWO PGPS GRADED 6, THREE GRADED 5, AND ONE GRADED 4).

GOALS

Goal

Place UFPE among the 10 main research institutions in the world in characterizing and describing Tropical Biodiversity

Description

Pressures associated with human activities, particularly with regard to the exploitation of natural resources and the transformation of habitats, have put diverse living organisms at risk even before their description (less than two million species have already been described of an estimated total of approximately 10 million). The description and characterization of biodiversity involves systematic, phylogenetic, cytogenetic, population, biogeographic and other studies. Integrative analyses have allowed considerable advances in the description of biodiversity at all levels, from the mapping of species to the analysis of genetic diversity and evolutionary potential of lineages in a context of global changes. The PGPs at UFPE related to this objective already carry out integrative analyses with established international partners, making the group already a national reference with respect to the biodiversity found in northeastern ecosystems, mainly in the Atlantic Forest, Caatinga, and Coastal Ecosystems. With an increase in international mobility actions through the support of PrInt, the impact of its production is hoped to increase so as to obtain greater visibility and international prominence, making UFPE one of the leading research institutions in the world in the characterization and description of tropical biodiversity.

Goal

Place UFPE among the 10 main research institutions in the world in the use and conservation of the natural resources and biodiversity of tropical environments

Description

Nature is central to various recreational, ecological, cultural, scientific, and economic aspects of biodiversity that make human life possible. Estimates made at the end of the last century have indicated that the services provided by ecosystems in the biosphere are worth twice the total gross domestic product of all nations. Conservation studies aim to examine how man-made disturbances and changes in the precipitation regime affect biodiversity at different levels of biological organization and what the implications are for the sustainability of systems based on subsistence agriculture / livestock and extractivism. Five PGPs have been associated with this objective, which have already been carrying out studies on the use and recovery of degraded areas and conservation of the different ecosystems of the Brazilian Northeast. In this sense, the group is already a national reference in studies on the conservation of biodiversity in northeastern ecosystems, especially in the Atlantic Forest, Caatinga, and Coastal Ecosystems. The expansion of international mobility actions through the support of PrInt will afford greater visibility and international prominence to the institution's scientific production, making UFPE one of the main research institutions in the world in the use and conservation of tropical biodiversity.

Goal

Establish at UFPE a strategic thinking research group working on the sustainability of tropical ecosystems and generating quality knowledge and support for the development of public policies

Description

According to the Sustainable Development Objectives, there is a need to promote effective evidence-based policies to ensure that services provided by ecosystems are reflected in sectoral and national development strategies. However, there is currently a dearth of scientific information capable of supporting the development of public policies and initiatives to support sustainability in all development activities in tropical regions. In the last decades, UFPE has been increasing its critical mass capable of integrating information from different disciplines and, thus, proposing objective guidelines for sustainability. In this way, human resources at the institution need to be qualified not only in the area of generating quality scholarly work, but also in actively participating in the dissemination and formulation of public policies. This is an urgent global demand, given the effects of climate change and land use on fragile tropical societies. The Northeastern Biodiversity Management Center aspires to carry out this work, increasing international mobility actions through the support of PrInt, in order to affect a greater exchange of experiences, strengthening UFPE's strategic thinking research group studying the sustainability of tropical ecosystems.

Theme	Partner countries
INNOVATION IN THE BASIC SCIENCES	Austria; China; Netherlands; Poland; Argentina; Spain; United States; Singapore; Kingdom United; Sweden; Portugal; Russia; Denmark; Colombia; Iran; Canada; Armenia; South Korea; Mexico; Switzerland; Germany; France; Israel; Chile; Italy;

Justification

THE BASIC SCIENCES ARE AT THE CORE OF THE GENERATION OF KNOWLEDGE LEADING TO THE TECHNOLOGICAL IMPLICATIONS AND INNOVATIONS THAT GENERATE ECONOMIC AND SOCIAL IMPACTS. THERE IS NO WAY TO SEPARATE BASIC SCIENCE FROM TECHNOLOGY AND INNOVATION. FROM THE POINT OF VIEW OF THE UFPE INTERNATIONALIZATION EFFORT, INNOVATION IN THE BASIC SCIENCES PRIMARILY MEANS EXPANDING THE INTERACTIONS BETWEEN UFPE PROFESSORS, RESEARCHERS, AND STUDENTS WITH THEIR PEERS IN DIFFERENT COUNTRIES THROUGH A STRONG DUAL-MOBILITY ACADEMIC PROGRAM. AS IMPORTANT AS IT IS TO HAVE A GOOD PART OF THE UFPE FACULTY AND STUDENTS VISIT AND INTERACT WITH COLLEAGUES AT INSTITUTIONS ABROAD, EFFORTS TO DRAW STUDENTS AND PROFESSORS FROM FOREIGN INSTITUTIONS TO UFPE TO SHARE THEIR EXPERIENCES AND KNOWLEDGE WITH A GREAT NUMBER OF UFPE STUDENTS AND PROFESSORS MUST BE AT LEAST COMPARABLE TO THOSE AIMED AT OFFERING UFPE SCHOLARS THE OPPORTUNITY TO GO ABROAD. BASED ON MOBILITY AND CONSIDERING UFPE'S INTERNATIONALIZATION PLAN (UIP), THIS PROJECT SHOULD SOLIDIFY ACTIONS FORESEEN IN THE UIP IN ORDER TO: (A) GIVE NATIONAL AND INTERNATIONAL VISIBILITY TO THE INSTITUTION'S TEACHING, RESEARCH, AND INNOVATION ACTIVITIES; (B) STRENGTHEN AND INCREASE THE PRODUCTION OF KNOWLEDGE AND RESEARCH CARRIED OUT AT UFPE, PROMOTING PARTNERSHIPS AND CONNECTIONS WITH STRATEGIC INTERNATIONAL NETWORKS; AND (C) PROMOTE AN INTERCULTURAL AND INTERNATIONAL TEACHING-LEARNING ENVIRONMENT THAT BENEFITS THE PROCESS OF QUALITY TRAINING FOR ALL. THE RESEARCH AREAS SPECIFIED IN EACH SUB-PROJECT ADDRESS ISSUES AT THE FRONTIER OF KNOWLEDGE AND GLOBAL INTEREST IN THEIR RESPECTIVE FIELDS, WHICH WILL CERTAINLY ATTRACT THE INTEREST OF FELLOW RESEARCHERS FROM OTHER INSTITUTIONS ABROAD. IN ADDITION TO INTERACTING WITH INSTITUTIONS WITH WHICH THERE IS ALREADY SOME KIND OF COLLABORATION, OFTEN AT THE INDIVIDUAL LEVEL, THE INSTITUTIONALIZATION OF THE INTERNATIONAL COLLABORATIVE PROCESS WILL BE OF PARAMOUNT IMPORTANCE TO ENSURING CONTINUITY IN THE PROCESS, INCLUDING NEW INSTITUTIONS. AT THE RISK OF SOUNDING REDUNDANT, WE URGE THAT INNOVATION IN THE BASIC SCIENCES IS ESSENTIAL AND NECESSARY TO THE PROCESS OF KNOWLEDGE GENERATION, AND HUMAN RESOURCES ARE INSTRUMENTAL TO THIS WHOLE PROCESS. MOBILITY IS, THUS, AN ESSENTIAL TOOL FOR INNOVATION IN THE BASIC SCIENCES.

GOALS

Goal

Strengthen and consolidate the production of knowledge and research carried out at UFPE, promoting partnerships and connections with strategic international networks through an academic mobility program.

Description

The objective linked to the theme of this project is part of the UFPE Internationalization Plan (UIP), and PrInt is an excellent opportunity to facilitate, with actions, mobility for this part of the plan. Strengthening knowledge production is achieved through international engagement with colleagues—students and researchers—who work on related issues, with different visions and infrastructures, working complementarily to the existing scientific approaches to the scientific problems and challenges proposed in the subprojects. The above objective also meets one of the main objectives of PrInt / Capes 41/2017, namely to "Foster the construction, implementation and consolidation of strategic plans for internationalization of the institutions contemplated in the areas of knowledge they prioritize." In fact, we can summarize the objectives of the public call for proposals (item 1.2) in the objective above. Mobility is an instrumental resource, which directly contributes to training highly qualified human resources. Mobility also has a significant influence on theses, dissertations, articles in journals with high impact factors circulating internationally, and presentations at national and international conferences. The impact of these results will be observed through the transformation of UFPE into an environment of teaching and research meeting international standards of excellence.

Theme	Partner countries
STATE AND SOCIETY IN GLOBAL CONTEMPORANEITY: DYNAMICS OF INEQUALITY AND DEVELOPMENT	Italy; United States; Switzerland; France; United Kingdom; Spain; Uruguay; South Africa; Mozambique; Mexico; Argentina; Portugal;

Justification

BOTH THE STATE AND SOCIETY ARE THREATENED BY GLOBAL RISKS RESULTING FROM A VARIETY OF PROCESSES AND RELATIONSHIPS, PRESENTED IN THREE (3) THEMATIC BLOCKS AS FOLLOWS: A. DEMOCRACY, INEQUALITIES, AND DEPRIVATION OF RIGHTS; HUMAN RIGHTS AND INEQUALITIES; SOCIAL STRUGGLES, WOMEN'S MOVEMENTS, AND COPING WITH INEQUALITIES; PERIPHERAL CAPITALIST DEVELOPMENT: SOCIAL, POLITICAL, AND ENVIRONMENTAL IMPACTS AND CONFLICTS; WORK AND MIGRATION; HOUSING AND MIGRATION; AND QUALITY OF LIFE OF POPULATIONS. TODAY, THE SOCIOPOLITICAL RESPONSES THAT HAVE BEEN PRESENTED AS AN ALTERNATIVE TO ECONOMIC GROWTH, THE REDUCTION OF INEQUALITIES AND THE SOCIAL CONSEQUENCES ON THE WORLD POPULATION, PARTICULARLY THOSE IN DEPENDENT AND PERIPHERAL CAPITALIST COUNTRIES, HAVE PROVEN INSUFFICIENT AND REDUNDANT IN LIGHT OF THE PRECARIOUS CONDITIONS OF LIFE AND WORK OF THESE POPULATIONS. THE RELATIONSHIP BETWEEN DEVELOPMENT AND INEQUALITIES WILL BE APPROACHED FROM THE ANALYSIS OF THE SUPPRESSION OF RIGHTS AND CONTEMPORARY STRUGGLES. B. SOCIAL INEQUALITY IN BRAZIL INTERPRETED IN THE LIGHT OF PIERRE BOURDIEU'S THEORY; GLOBALIZATION OF AGRICULTURE AND SOCIAL INEQUALITIES; GLOBALIZATION AND CULTURAL SUPERDIVERSITY; GLOBALIZATION UNDERSTOOD AS A WORLDWIDE PROCESS OF ECONOMIC, SOCIO-POLITICAL, SPATIAL AND CULTURAL INTEGRATION HAS GENERATED FORMS OF UNEVEN DEVELOPMENT IN COUNTRIES OF PERIPHERAL CAPITALISM: EITHER AT THE LEVEL OF LAND CONCENTRATION AND THE INEQUALITIES IT GENERATES, DISTRIBUTION AND CONSUMPTION OF CULTURAL CAPITAL OR EVEN OF THE FORMS OF INTELLECTUAL PRODUCTION IN SPACES OF POWER AND DOMINATION. THESE DIMENSIONS WILL BE ANALYZED IN LIGHT OF THE NEW INTERNATIONAL DIVISION OF LABOR; FROM A THEORETICAL PERSPECTIVE THAT IS KEY TO DISCUSSING CURRENT CULTURAL CAPITAL AND THE RELATIONSHIP BETWEEN SUPERDIVERSITY AND GLOBAL CULTURAL PROCESSES. C. CORRUPTION AND POLITICS, THE PHENOMENON OF CORRUPTION IS SEEN AS A PRACTICE THAT AFFECTS THE FUNCTIONING OF POLITICS, OF REPRESENTATION, WITH CONSEQUENCES FOR THE QUALITY OF PUBLIC POLICIES AND INTERNATIONAL RELATIONS. THE AIM IS TO DEVELOP WAYS OF MEASURING CORRUPTION, BUILDING CREDIBLE INDICATORS AND DATABASES AND IDENTIFYING THE CAUSES OF CORRUPTION AND ITS EFFECTS ON POLITICAL BEHAVIOR, PUBLIC POLICY, AND INTERNATIONAL RELATIONS.

GOALS

Goal

Problematize theoretical references that deal with cultural production in spaces of power and domination, with an emphasis on literature produced in Portuguese

Description

In the last decades of the 20th century, Cultural Studies and Literary Studies have merged into one area. This entails a complex process that occurred within the humanities as an attempt to respond to emerging challenges arising from struggles for liberation in the African and Asian continents, on the political and ideological fronts, and the so-called "linguistic turn" on the epistemological plane. The world order was affected by processes of conquest and independence and also by the persistence of a cultural "superdiversity" alongside homogenizing processes (globalization). Such transformations and lasting impacts demanded the production of new perspectives on cultural phenomena. As far as Cultural Studies is concerned, the emergence of a theoretical field called Post-Colonial Studies / Theories stands out. In the field of Literary Studies, after the wide dissemination of Comparative Literature, the concept of World Literature emerged in the late twentieth century in an epistemological gesture of inclusion of literatures that were not considered to belong to the "Western-centric" canon of literary theory, which "brought countless contributions to a possible corpus of 'world literature.'" The proposal we present inquires as to the limits and possibilities of such theoretical references by placing the focus of the analysis on literatures produced in the Portuguese language and on African literatures in a broader sense, yet linguistically limited to the colonial "African literatures in Portuguese, Spanish, English, French", etc. To what extent are the assumptions of postcolonial theories and their theoretical contributions reproducing rationales based on national identities, typical of the "colonial era"? To what extent does the concept of world literature, by suggesting the questioning of the paradigm of national literatures, neglect fundamental aspects such as domination, hegemony, and power of complex national, regional, international, and transnational frameworks? What are the clashing forces (or alliances) triggered by the various political, social, and cultural institutions, whether they be nation-states, educational policies and programs, publishers, writers, literary prizes, academic production and debate, among others?

Goal

Investigate the reception of the work of the sociologist P. Bourdieu in Brazil from a comparative perspective encompassing the United States, Argentina and Mexico within the international project Pierre Bourdieu et les Amériques

Description

Intensify the international collaboration and participation of PGPS in this project on the circulation of ideas of Pierre Bourdieu in the American continent, entitled "Internationalisation des sciences sociales: Pierre Bourdieu et les Amériques - Revisiter les archives d'une internationale scientifique en contexte de Global Science". The international project is coordinated by Frank Poupeau, Director of Research at the Centre National de Recherche Scientifique - CNRS and professor at the École des Hautes Études en Sciences Sociales, both in France. Bourdieu is recognized worldwide as one of the leading theorists and analysts of social inequality. This research project is aimed at the impact of his work on Brazilian Sociology. Participation in the international cooperation network will afford researchers the opportunity to consult Pierre Bourdieu's archives, which include extensive documentation on the internationalization of the Social Sciences. The Brazilian-based research will be coordinated by Profa. Maria Eduarda da Mota Rocha (PGPS-UFPE). The major project to which the research coordinated by the PGPS-UFPE will contribute aims to clarify the processes that made possible the internationalization of the social sciences from the perspective of the dissemination of the work of Bourdieu across the American continent, as well as aims to constitute a transnational network of research to revisit the empirical studies favored by the French author and his main mediators in the American continent, now in the context of Global Science. In this sense, the research itself will reconstruct Bourdieu's attempt to articulate an international network of researchers dedicated to the theme of social inequality in its various facets—what could be called an "international científica". The process of internationalization of sociology, the "transatlantic" circulation of ideas, concepts, theories, and methodologies, is the ultimate focus of this project, as well as understanding the way in which such theoretical and methodological support has contributed to our understanding of Brazilian society.

Goal

Examine changes resulting from the globalization of food and effects on the organization of production and labor

Description

This project is part of the field of Sociology of Agriculture and Food with special attention on the field that extends from the understanding of production spaces to those of food distribution and consumption. Processes involving the production, distribution, and consumption of food on the basis of inequalities that range from the limits of access to land and reproduction of family production units to working conditions show high levels of exploitation of workers. These processes require the permanent attention of the Social Sciences; the field of food globalization constitutes an important area for future studies (Bonanno & Cavalcanti, 2014). A new field of study focuses on control over labor and laborers in order to guarantee the traceability and the fast movement of goods, certified and labeled according to parameters of quality. However, the broad scope of food quality, while taking into account phytosanitary practices and attention to agricultural best practices, lacks the same kind of care for workers who, despite these controls, according to the demands of consumers and their distributors, are exposed to situations of continuous precariousness and low wages and to informality and fragile linkages. Analyzing the specificities and generalities of these processes and deepening the study of the mobilities and vulnerabilities of workers, in continuity to the project underway, supported by the CNPq, requires adopting a broad perspective of observation of the phenomenon without losing the local references. This is also part of the objectives of the Globalization and Agriculture research group. Participating in Latin American and international research networks such as the RC40 of the ISA - International Sociology Association, CLACSO WG 45 and research with Comahue University, and the recently approved research agenda at UNASUR allows us to analyze and understand multiple facets, the character of the diversity of processes involved in the globalization of agriculture and the inherent inequalities. Without neglecting to further studies on a case in which we observe transformations in the realms of labor, namely the case of the São Francisco Valley, we broaden our observation and analysis to comprehed the changes in the broad field of food globalization, inequalities, the role of the State, and its repercussions on local territories.

Goal

Develop high quality knowledge and impact in the area of corruption

Description

Our aim is to develop among the knowledge, techniques, and human resources of the institution, through the exchange of knowledge with foreign researchers and universities, new ways of measuring the phenomenon of corruption in Brazil. We aim to train skilled human resources to employ quantitative and qualitative methods in the study of corruption and expand such knowledge through interactions between participants and non-participants of the study and also members of civil society. We will identify the causes and effects of the phenomenon of corruption on the quality of political representation, political behavior, government management, and public policies, as well as the quality of international relations. We aim to develop quality, high-impact research resulting in articles and books, making UFPE an international reference in the study of corruption and an institution cooperating with foreign institutions to better understand the phenomenon. Lastly, we will promote new tools for transparency and attenuate the effects of corruption on citizens, reducing inequalities and increasing development.

Goal

Produce critical knowledge about the relationship between development and inequalities, identifying macro-societal dynamics and sociopolitical phenomena that affect the relationship between the state and society

Description

The societal transformations whose strongest expressions are linked to changes in work, politics, and culture have led to the emergence of new phenomena in global societies: the precariousness of labor; the feminization of the labor market; conflicts over access to natural resources; mass migrations; forced spatial displacements; impoverishment on a world scale; and the emergence of conservative movements, among others. Several theoretical perspectives have sustained the emergence of such problems that are crossed by new dimensions: gender, race, and ethnicity. Economics, politics, and culture are, therefore, articulated processes in the subjects studied, requiring studies and research that contribute to the understanding of the state/society relation in the contemporary context and propose alternatives that have an impact on the effects of global inequality.

Theme	Partner countries
INNOVATION IN HEALTH	United Kingdom; Italy; Colombia; France; Canada;

Justification

INNOVATION IN HEALTH IS A PRIORITY AND STRATEGIC AREA OF NATIONAL AND GLOBAL POLITICS. IN FACT, THE EXPRESSIVE GROWTH OF THE GLOBAL CONSUMPTION LEVEL, COUPLED WITH THE EXPANSION OF HEALTH DEMANDS, HAS RAISED CONCERNS ABOUT THE SUSTAINABILITY OF LIFE ON THE PLANET. SUCH CONCERNS LED THE UN TO APPROVE THE MILLENNIUM DEVELOPMENT GOALS (MDGS) IN 2000 IN LINE WITH THE MILLENNIUM DECLARATION. AMONG THE MDGS, THIS PROPOSAL IS ALIGNED WITH THE NEED FOR QUALITY HEALTH AND AN INCREASE IN THE COMPETITIVENESS OF THE HEALTH INDUSTRIAL COMPLEX THROUGH INNOVATION. IN ADDITION, HEALTH INNOVATION IS IN LINE WITH NATIONAL PUBLIC POLICY GUIDELINES FOR THE SECTOR, GUIDED BY UFPE'S STRATEGIC INSTITUTIONAL PLANNING, NATIONAL POST-GRADUATE PLAN, AND NATIONAL SCIENCE, TECHNOLOGY, AND INNOVATION STRATEGY, AMONG OTHERS, WHICH SEEK TO ALIGN AND TO ESTABLISH IN BRAZIL A NEW TRAJECTORY OF DEVELOPMENT AND SUPPORT OVERCOMING INTERNAL AND EXTERNAL IMBALANCES. THEREFORE, UFPE HAS BEEN WORKING TO BRING TOGETHER SEVERAL SCIENTIFIC AND TECHNOLOGICAL FIELDS OF ACCELERATED GROWTH SUCH AS NANOTECHNOLOGY AND BIOTECHNOLOGY, IN PARTICULAR TO IMPROVE HEALTH AND HUMAN PHYSICAL CAPACITY, THROUGH ITS POST-GRADUATE PROGRAMS INVOLVED IN RESEARCH ON THE FOLLOWING: THERAPEUTIC INNOVATION (CONCEPT 5), BIOLOGICAL SCIENCES (CONCEPT 5), TROPICAL MEDICINE (CONCEPT 5), AND GENETICS (CONCEPT 4). THESE PROGRAMS OPERATE IN CONVERGENT LINES OF RESEARCH FOCUSED ON TRANSLATIONAL RESEARCH, WITH TECHNOLOGICAL SOLUTIONS GENERATED THROUGH RADICAL AND INCREMENTAL INNOVATION. AMONG THE TOPICS STUDIED, THE ENTIRE PRODUCTION CHAIN OF DRUGS PERMEATES TRANSVERSAL THEMES IN BASIC RESEARCH AND ADVANCED TECHNOLOGIES, WITH EMPHASIS ON PRE-CLINICAL AND CLINICAL TRIALS OF NEW DRUGS AND INDUSTRIAL-SCALE DEVELOPMENT. CONSIDERING THE INNOVATIVE AND TRANSVERSAL CHARACTERISTIC OF THE PRESENT PROPOSAL, A SIGNIFICANT CONTRIBUTION TO THE TRAINING OF HUMAN RESOURCES AND SCIENTIFIC-TECHNOLOGICAL ADVANCES AT THE NATIONAL AND INTERNATIONAL LEVELS ARE HOPED TO BE ACHIEVED, THROUGH PARTNERSHIPS WITH INTERNATIONAL RESEARCH GROUPS OF EXCELLENCE IN THE AREA OF HUMAN HEALTH AND THROUGH TRANSLATIONAL RESEARCH FOR THE DIAGNOSIS AND TREATMENT OF DISEASES OF WORLDWIDE INTEREST. THEREFORE, CONTRIBUTING TO CHANGES IN PUBLIC HEALTH POLICIES IN BRAZIL, SPECIFICALLY FOR THE SUS SYSTEM, THROUGH TECHNOLOGICAL SOLUTIONS TO IMPROVE PEOPLE'S QUALITY OF LIFE.

GOALS

Goal

Make UFPE an international reference in Research, Development, and Innovation in the training of human resources in therapeutic and diagnostic innovation for rare disease(s)

Description

In order to increase the international competitiveness of UFPE, new technological solutions will be developed based on a portable autonomous hybrid prototype for rapid multiparametric diagnosis of rare disease(s). In addition, international skills will be consolidated for the pre-clinical development of bioactive products in the search of the humanization of new technologies for health through the application of in vitro and in vivo methodologies for autoimmune and rare diseases. In this way, human resources will be trained for the development of nanostructured devices that support the immobilization of biomolecules with top-level control subsystems for algorithms for pattern recognition and data mining. In addition, the economic efficiency of the new technological solutions will be evaluated. Moreover, to make UFPE the world leader in health innovations, work missions by national teachers / researchers will be carried out. Therefore, UFPE researchers will be trained to become a national and international reference in therapeutic and diagnostic innovation. In addition to the Doctoral School of Innovation in Health, there will be publications in scientific journals of high international impact and patents will be filed in efforts toward technological innovation. In this way, the Center for Therapeutic Innovation will act as a world reference in therapeutic and diagnostic innovations consolidating an international center of health innovations based at UFPE.

Goal

Develop translational research related to Health Innovations for rare disease(s), placing UFPE among the top research institutions in the world

Description

The present objective is a continuous action that has been carried out in a translational way by several researchers from diverse areas of knowledge. In this sense, we will act in an integrated and synergistic way in the search of strengthening research in rare disease(s) in order to guarantee the incorporation of new technologies. The execution of this research in the form of international networks will improve and consolidate scientific, technological, and innovation activities developed by UFPE research groups concerned with the transformations to which we are subject over the coming years in the field of health. In this way, UFPE will become an international protagonist in rare disease(s) acting in strategic areas of health, nanobiotechnology, therapeutic innovation, human health supplies, new diagnostic materials, and new medicines. The development of new technological solutions for rare disease(s) is intended to solve the current demands on Health in Brazil and in the world. In addition, UFPE intends to increase scientific-technological development in clinical research in the country in partnership with major International Clinical Research Centers. At the same time, these actions contribute to the expansion of partnerships with the industrial sector and the strengthening of intellectual property protection, technology transfer, and technology production to increase Brazilian autonomy and competitiveness in the pharmaceutical sector. In addition, there will be an increase in the number of patents in the INPI and in international organizations

Goal

Develop therapeutic strategies against lesions associated with papillomavirus infection in an innovative pre-clinical model related to HPV16.

Description

The focus of research and development of HPV16 immunotherapy through the production of plasmids, HPV antigens, and adjuvant immunomodulators in bacterial and plant systems are highly pertinent as innovative approaches to addressing an urgent clinical demand in society. In this way, the strategies of i) evaluation by preclinical test of the antigenic plasmid constructs aiming at the genetic immunization with in vitro predicted MHC-I binding epitopes based on the oncogenic proteins E5, E6, and E7; ii) development of new models for combating tumors in evaluation of HPV16 DNA vaccines, based on tumor cells expressing viral genes; iii) use of molecular immunomodulators such as peptide II-PADRE on the proposed vaccine formulations; and iv) establishment of technological transfer for heterologous production of vaccine antigens against HPV found in plants are linked to the theme of innovation in Human Health.

Goal

Place UFPE among the world's leading institutions in the training of qualified human resources in health innovations through partnerships with research institutions of international excellence

Description

Due to its size and the quality of its activities, UFPE is today one of the largest universities in the country, with a continued preoccupation with ensuring the excellence of its human resources training programs, as well as the expansion and improvement of research activities at the institution. The increase in the number of Post-Graduate Programs (PGP) sensu stricto at UFPE has demonstrated the growth potential of the institution in meeting the demand of society in almost all areas of knowledge, highlighting programs that vision to train human resources in the area of innovation in health. Currently, UFPE has more than 200 international cooperation projects involving more than 26 countries, including Portugal, USA, France, Germany, England, Italy, and Spain, allowing graduate students to study abroad. In addition, international partnerships will enable UFPE to become a center of excellence in research, development, and innovation with ample training of internationally qualified human resources and with the purpose of contributing to the Brazilian capacity for innovation in the sector of strategic health input with emphasis on drugs and medicines, an area of strategic priority to UFPE, the Ministry of Science, Technology and Innovation, and the National Post-Graduate Plan, among others. Clearly, this proposal will provide academic and scientific support for the training of masters, doctoral and postdoctoral students in several UFPE post-graduate programs, among which we can highlight: Therapeutic Innovation, Biological Sciences, Tropical Medicine, and Genetics.

Goal

Develop a new generation of tools to improve the effectiveness of disease diagnosis and therapy through innovation in health by training highly specialized human resources.

Description

The actions proposed in the present project will allow the institutional internationalization of UFPE, improving undergraduate and postgraduate training aimed at educating highly qualified human resources through the consolidation of an international research network in Health Innovation. In addition, to offer support regarding teacher and student mobility, scientific results, and their valorization, there will be a School of Advanced Studies in Health Innovation operated by national and international researchers. Complementing the technical-scientific aspects of health innovation, valorization and patenting activities will be addressed. It is worth mentioning the development of face-to-face classes offered by Brazilian researchers or by foreign researchers working at UFPE or by those invited to speak at the institution, and other activities through courses with videos, discussion forums, teleconferences, etc. The proposal will act synergistically in the different aspects of the production chain: from diagnosis to therapeutics, including pharmaceutical nanobiotechnology, nano-devices for diagnosis, new materials with health applications, DNA vaccines, development of new pharmaceutical raw materials, among others. Thus, allowing the formation of human resources and increasing the competitiveness of UFPE.

Goal

Strengthen the internationalization and training of human resources in the areas of biotechnology and health chemistry of the PGPCB aimed at health innovation

Description

The main objective of the proposal presented by the Graduate Program in Biological Sciences (PGPBS) is to train doctoral students under the supervision of scholars at the University of Paris (UPSud-Saclay) and to establish opportunities abroad for Brazilian post-docs in the academy or in the pharmaceutical industry, as well as highly competent individuals in the field of nanobiotechnology at UFPE. In this context, translational actions of innovative nanotechnology are proposed using biomaterials of the fauna and flora of the Brazilian north-northeast for research, development, and innovation of nanosystems of controlled release drugs of natural origin or of synthesis for oral administration applied to treatment of infectious diseases and diseased affecting the central nervous system. Bilateral effforts, with courses on pharmaceutical nanobiotechnology taught by French researchers at UFPE via the Doctoral School of Innovation in Health. Controlled release of drugs is a very active field of research and will continue to be a cutting-edge topic in the coming years. Initially, many "small molecules" (poorly insoluble in water and / or hydrophilic and poorly permeable through membranes) still present low or inconsistent bioavailability problems. Second, the explosion in the market for biotech drugs, including not only proteins, antibodies, drug-antibody conjugates (ADCs), but also fragile peptides and nucleic acid derivatives, makes it necessary to develop and produce systems specifically designed for these new materials. Overall, considerable advances in nanotechnology have made possible the emergence of auto-active nanomedicines. In addition, bioactive molecules from the synthesis of plant and food by-products will be studied, aimed at encapsulation in nanosystems to improve their health promoting properties. Based on our long-term collaboration, the overall objective of this project is to coordinate our efforts by working on selected topics that are ongoing projects in our respective teams or that we can rapidly activate on both sides to meet the demand for resource formation at the doctoral level. In addition to the scientific results and their value, this collaboration will establish an international doctoral school of education dedicated to students interested in the innovation of nanotechnology-based controlled release drugs.

Goal

Proteomically characterize target-specific sites of bioactive molecules derived from cercosporamide with antifungal potential and ability to reverse resistance

Description

Heterocyclic compounds perform antifungal activity, but with regard to cercosporamide there is no information in the literature. Consequently, during our successful attempts to find biologically active compounds, cercosporamide has inspired the development of derivatives. For this, we plan to synthesize new dibenzofuran antifungal agents and determine their mechanisms of action. The strategy of mimicking natural products for the design of antifungal agents in order to combat fungal resistance has recently been validated through the discovery of xanthones derived from α-mangostine. In addition, it has been discovered that cercosporamide recognizes ATP binding sites of Mnk2 kinase through a hydrogen bonding network due to 3-OH and 4-CONH 2 of the phenyl moiety, justifying the strategy of maintaining the dihydroxybenzofuran carboxamide part of the natural product for the design of new tricyclic compounds. In experimental infection models, deleted strains for the MAPK elements mediated by transduction signal exhibit a reduction or loss of virulence such as the decrease in biofilm formation. In C. albicans, protein kinase C (called CaPkc1), one of the key proteins involved in MAPK signaling pathways, is described as a cell wall integrity regulator during growth, morphogenesis, and cell wall stress response. Because of the limited number of antifungal agents used in clinical practice and the emergence of increasing drug resistance, there is clearly an urgent need to identify alternative targets in order to accelerate the development of a new generation of antifungal agents that are even more effective or capable of restoring susceptibility to antifungal drugs. In this context, targeting such as the PKC-mediated transduction signal represents a novel and attractive strategy for antifungal therapy, in particular against yeasts of the genus Candida.

Goal

Consolidate international research network in research, design, and innovation for health innovations in rare disease (s) allowing the worldwide protagonism of UFPE

Description

The focus of this project is the consolidation of an international research network for studies on health innovation, especially in rare disease(s). The network of international scientific collaboration will potentiate knowledge-intensive research actions considering the articulation of different competences present in the project. It should be noted that UFPE has the following priority actions in its strategic planning: maintain and consolidate the groups of academic and scientific excellence in the area of Innovation in Health; support research groups and graduate programs in order to reach levels of excellence; implement actions to improve and maintain the infrastructure necessary for the development of research and graduate studies in Health Innovation; integrate research actions for the solution of regional, national, and international problems related to human health; structure the necessary conditions to ensure adequate protection, management, and transfer of intellectual property; and stimulate the creation of technology-based companies, based on research developed at the institution. UFPE's competencies are aligned with the theme of health innovation and with postgraduate programs in health composed of multidisciplinary teams in line with areas of interest in the pharmaceutical chain, such as: Molecular Modeling, Synthesis and Pharmacy Scheduling, Pharmacology, Biomarkers, Nanotechnology, Biotechnology, Toxicology, Quality Control, among others. Thus, in addition to international partnerships, UFPE will become a global player in the area of Health Innovation focused on rare disease(s).

Theme	Partner countries

SYSTEM MODELING	Spain; China; United States; Turkey; Sweden; Poland; France; United Kingdom; Italy; India; Belgium; South Africa; Mexico; Austria; Canada;

Justification

THE FEDERAL UNIVERSITY OF PERNAMBUCO HAS CENTERS OF EXCELLENCE THAT DEVELOP RESEARCH OF HIGH SCIENTIFIC IMPACT, PRESENTING ADVANCES AND INNOVATIONS IN MATHEMATICAL AND PROCESS MODELING IN COMPLEX SYSTEMS IN DIVERSE AREAS, INCLUDING COMPUTING AND INFORMATION TECHNOLOGY, PRODUCTION ENGINEERING, ELECTRICAL ENGINEERING, AND CIVIL ENGINEERING. THE RESEARCH DEVELOPED ON THIS THEME INVOLVE INNOVATIVE METHODOLOGICAL CONTRIBUTIONS, CORRESPONDING TO BASIC AND FUNDAMENTAL RESEARCH, AS WELL AS THE MODELING AND INNOVATIVE PROCESSES APPLIED TO RELEVANT PROBLEMS IN ORGANIZATIONS AND SOCIETY. AMONG THE MAIN RESEARCH THEMES AND PROBLEMS ADDRESSED ARE THE DEFINITIONS OF MODELS AND METHODS, DETERMINATION OF THEIR PROPERTIES, PROPOSITION AND IMPLEMENTATION OF COMPUTATIONAL SYSTEMS; ANALYTICAL MODELS TO SUPPORT DECISION MAKING AND THE APPLICATIONS OF THESE MODELS IN DIFFERENT PRODUCTIVE SECTORS; MATHEMATICAL MODELS OF OPTIMIZATION, QUANTIFICATION OF NUMERICAL SIMULATION UNCERTAINTIES FOR COMPLEX ENGINEERING PROJECTS; AND MODELING IN SIGNAL PROCESSING AND COMMUNICATIONS. THE ADVANCES DEVELOPED IN THIS AREA ARE DIRECTED TOWARDS SOCIETY, WHICH DEAL WITH RELEVANT PROBLEMS LINKED TO THE REAL WORLD AND WITH REPERCUSSIONS FOR THE SCIENTIFIC COMMUNITY AND SOCIETY, POSITIONING UFPE AS AN INTERNATIONAL REFERENCE AND NATIONAL LEADERSHIP IN THIS AREA.

GOALS

Goal

Develop new techniques for digital communication of data

Description

Find new convolutional codes with high rates and design new digital communication systems based on chaotic attractor topology

Goal

Propose, model, develop and implement computational models of the most diverse sub-areas of computing

Description

Create the computational models in computer systems engineering; software engineering and programming languages; data management and information retrieval; computational intelligence and artificial intelligence; media and interaction; computer networks and distributed systems; theory and fundamentals of computing through the proposition and development of: intelligent systems for automatic processing of audio and video signals, for diagnosis and pattern recognition, for categorization, for handling large volumes of data, for optimization, for prediction of temporal series; of new methods of supervised, semi-supervised, and unsupervised learning for neural networks with particular interest in use with deep neural networks for signal processing and management of network and distributed system services; formal definitions and efficient implementations of reasoners for several fragments of classical and non-classical description logic; frameworks for software projects, investigating its successful and failed elements and dealing with cases of practical applications such as applications aimed at supporting health systems; improvements in support for the prevention, detection, and resolution of code integration conflicts; solutions for the construction of adaptive middleware that integrates concepts of software architecture, light formalization, and process mining; techniques and tools to improve the security of IoT devices, such as techniques that can detect vulnerabilities in equipment, protocols, and applications involved in an IoT environment; development of hardware accelerators for computer vision and machine learning applications; specification and implementation of efficient algorithms for: prediction of pictograms; syntactic and semantic evaluation of constructed phrases and expansion of telegraphic sentences into more expressive phrases; formalization of methodologies to specify, model, validate, design, and implement algorithms for planning, control, communications, integration of robotic systems for simulation and real implementation and proposition of new processes, languages, and tools in the theme; investigations into 5G networks of adequate technologies and paradigms based on cognitive/programmable radio /network and virtualization, as well as the analysis of the interrelationship between all technologies and how each layer can benefit from a possible transversal integration.

Goal

Make UFPE an international reference in the development and application of tools and techniques for systems modeling and productive processes of goods and services

Description

To situate UFPE among the world's leading institutions in the development and improvement of tools and techniques for systems modeling for the production of goods and services, focusing on: Organizational Information Systems, Reliability Engineering, Maintenance and Risks, Optimization of Systems and Productive Processes, Planning and Production Systems Management to improve business competitiveness. It also includes the dissemination and application of models and tools in different productive sectors, considering their peculiarities and challenges, positioning UFPE at the forefront of this knowledge.

Goal

Become a national reference and achieve international relevance in numerical simulation multidisciplinary optimization in Petroleum Engineering

Description

Develop computational tools for the simulation and management of petroleum reservoirs. These systems have a direct application to oil companies, such as those established with Petrobras about ten years ago. Here, efficient numerical strategies will be developed or used (commercial software) to solve some problems related to this application, such as porous flow simulation and geomechanical coupling, which play fundamental roles in the design of optimal and safe petroleum production strategies, among others. In addition, optimization of petroleum production can be conducted using computational fluid flow tools in numerical models of the oil reservoir. This is a very complex and important industrial problem the answer to which can lead to the profit from production being improved, taking into account the uncertainties of the geological properties.

Goal

Transform UFPE into a world reference in the development of analytical models to support decision making

Description

Make UFPE a world reference in the development of decision models, which include the methods of Multicriteria Decision Making and Group Decision and Negotiation. This objective also includes transforming UFPE into a reference in the use of advanced tools in neuroscience studies in decision making, to support methodological advances in decision support systems and their applications.

Goal

To develop signal processing techniques applicable to systems modeled using graphs

Description

To develop new concepts and techniques in the area of signals processing using graphs, especially with regard to the transformations defined on these structures, exploring their potential application in solving problems related to the treatment of data of multidimensional variables defined on network structures.

POSTGRADUATE PROGRAMS LINKED TO THIS PROPOSAL

Theme

BIODIVERSITY AND CONSERVATION OF NATURAL RESOURCES

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
OCEANOGRAPHY	5

Justification

The PGP in Oceanography (PGPO) has as one of its focuses the coastal and oceanic marine ecosystems. These habitat mosaics are closely intertwined, and this connectivity is vitally important for the sustainability of structural (biodiversity) and functional diversity (diversity of processes). Understanding spatial patterns is an essential prerequisite for effective management strategies. A more consistent understanding of the causes, patterns, mechanisms, and consequences of organism movement is critical to controlling the spread of pests or invasive alien species and, more broadly, to restoring and managing human activities within multiple-pressure marine landscapes, through marine spatial planning (eg, PADDLE project). The PGPO intends through the recently approved TAPIOCA Laboratory-Platform to install a center with effective monitoring capacity for large-scale oceanic circulation to the mesoscale based on satellite altimetry and an experiment to study specific dynamic patterns using modeling approaches. With this experience, TAPIOCA will serve as a regional training center. In addition, this experience will enable this Regional Center of Excellence to achieve the skills and competencies needed to develop oceanographic operational tools, such as in France, to monitor the Tropical Atlantic for the benefit of Brazilian society. This goal clearly inserts PGPO in the set of partners able to form the core of strategic thinking on the sustainability of tropical ecosystems. The vocation of studies on the use and conservation of marine ecosystems, highlighted by the expressive academic production and the formation of quality human resources will have increased its international insertion through the collaborations provided by the establishment of an expanded network of international collaborations.

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
PLANT BIOLOGY	6

Justification

The PGPPB has an enormous vocation for the production of knowledge and training of human resources focused on the science of biodiversity, with full adherence to the proposed objective. Regarding the description and characterization of biodiversity, the PGPPB has an area of concentration (Systematics and Evolution) with two lines of research focused on this theme. Although it has started with floral studies and morphological taxonomy, it is currently carrying out systematic and integrative genetic analyses, with established international partners, making the group a national reference already, particularly with regard to biodiversity in the northeastern ecosystems, such as the Atlantic Forest and Caatinga. The PGPPB is already the main national reference for studies of Ecology and Conservation (one of its two areas of concentration) regarding the sheltered biodiversity in the northeastern ecosystems. This fact is proven by the publication of books and reference articles on the natural history and conservation of these environments. The conservation studies under development in the PGPPB aim to examine how man-made disturbances and changes in the precipitation regime affect the Caatinga biota at different levels of biological organization and what the implications for the sustainability of the system based on subsistence agriculture / livestock and extractivism are. In the last decades the PGPPB has been increasing its critical mass, capable of integrating information from different disciplines and, thus, proposing objective guidelines for sustainability. In this way, human resources are trained not only in generating quality information, but also in acting in the dissemination and formulation of public policies. This is a global and urgent demand given the fragility of tropical societies in light of the effects of climate change and land use. The Northeast Biodiversity Management Center has this aspiration and should work as a model to be replicated through the support of PrInt. PrInt is expected to increase the impact of its outstanding international production through consolidation of a wide network of collaborators at the world's leading institutions.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
FUNGAL BIOLOGY	4

Justification

The PGP in Fungal Biology stands out as unique in Brazil considering its focus directed to the study of fungal diversity. The research projects and intellectual production developed in the program largely cover the biodiversity description of fungi and show their clear adherence to the Theme and the objective. With the support of PrInt, the polyphasic approach to the description of the Brazilian fungal diversity will be extended, increasing the impact and international visibility of the scholarly work carried out at the Postgraduate Program in Fungal Biology

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
CIVIL ENGINEERING	5

Justification

The topic conservation of natural resources, aiming at the sustainability of groundwater for future generations is part of the research lines of the group of researchers of the Laboratory of Environmental Sanitation linked to the Post-Graduate Program in Civil Engineering of UFPE. The exchange with institutions and groups from abroad has been a constant for LSA-UFPE researchers. PGPCE has extensive experience in biological processes for waste degradation. The LSA-PGPCE-UFPE group is already a national and international reference in anaerobic digestion of domestic and industrial wastewater. The deepening understanding of degradation processes of compounds of difficult degradation, acquired through the development of this project, in partnership with the industry, focused on the protection of tropical ecosystems, will contribute to establishing UFPE as a reference in the area. It is worth mentioning that the problems of environmental contamination by pollutants of difficult degradation are common in the local, regional, national and international spheres. With the support of PrInt, a greater visibility and internationalization of the UFPE research group is expected, a broader training for national and international doctoral degree in Environmental Technology, aimed at solving problems of pollution and contamination of water and soil and increase of scientific production with publication of articles in high-impact international journals.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
NUCLEAR AND ENERGY TECHNOLOGIES	5

Justification

The study of the Water and Carbon Dynamics in the Caatinga Biome has as its main axes Climate Change and the impact of contaminants on the soil-aquifer system and is linked to the lines of research of PROTEN. With the support of PrInt, PROTEN should become an international reference in carrying out research activities for the collection of climatic, ecohydrological, and biogeochemical carbon cycling data in semi-arid regions, and 3D imaging and the use of simulation models for the development of adaptation strategies / management of the Caatinga biome in the face of climate change.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
ANIMAL BIOLOGY	6

Justification

The Taxonomy of Recent Groups or description and characterization of biodiversity is one of the main research areas of the Post-Graduate Program in Animal Biology (PGPAB). The faculty is highly qualified and has a high volume of publications in this area. PGPAB has almost half of its research projects of excellence aimed at the study of the prospection and conservation of the biodiversity of marine and terrestrial environments. Several papers have been published on the simulation of future climate change scenarios that are an important tool for predicting their impacts on biota. The study of climatic variation and vegetation coverage of animals provides important descriptive characteristics for decision making related to conservation areas. In the PGPAB a large volume of projects has been developed on different aspects of the effect of human activities on the management and conservation of biological resources in different tropical ecosystems. This volume of projects includes work strictly focused on the development of methodologies to support decision making or support the development of conservation strategies. The Program seeks through PrInt to expand the use of new tools and innovative technology that will boost the results of greater impact and international visibility. Emphasis will be placed on international collaboration on the advancement of integrative taxonomy, aiming at improving the molecular systematics, advancing the study of new anatomical structures, through the training and use of equipment not yet available in Brazil. Missions and events related to scientific exchange with international researchers of excellence in the different aspects of conservation and management of biodiversity and natural resources, as provided by the PrInt-UFPE proposal, will be decisive for the establishment of a center for highly qualified researchers in the PGPAB.

Theme

INNOVATION IN THE BASIC SCIENCES

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
CHEMISTRY	6

Justification

The Post-Graduate Program in Chemistry (PGP-Chemistry) at UFPE started in 1989 with the recommendation of CAPES that degrees be offered at the masters and doctoral levels. Since then, the Program has diversified without departing from its established focus on Theoretical Chemistry and Spectroscopy, marked by a deep integration between theory and experiments, recognized worldwide. The Program seeks to offer the student an integrated perspective of Chemistry with research in areas that connect synthesis, characterization, exploration of properties, and applications of molecular systems, supported by theoretical and computational modeling. This perspective occurs within a highly interdisciplinary context, since the postgraduate students of PGP-Chemistry must study, in addition to the specific disciplines related to their research topic, classes in all four sub-areas of Chemistry. This differentiated training enables the training of versatile and active professionals in different sub-areas of Chemistry and related sciences. PGP-Chemistry stimulates, in particular, the mobility of post-graduates to internships in Brazil and abroad through collaborations and institutional programs. PGP-Chemistry postgraduates participate in scientific visits or doctoral exchange programs at various national and international institutions (Germany, Canada, Denmark, Spain, United States, France, England, Portugal, Poland, Sweden, among others). In order to strengthen the established groups, as well as promote the consolidation of new groups and lines of research, our proposal is based on the development of green methodologies for the production of new (bio-) compounds and (bio-, nano-) materials. These compounds and materials will present specific applications such as: luminescence applied to clinical diagnosis and medicine - (nano) thermometry and (nano) heating; fundamental studies relating structure and properties; processes and materials with applications in catalysis and energy, etc. These themes are of high international relevance. Therefore, we will emphasize the existing collaborations, as well as new collaborations, that prioritize the mobility of our students and teachers for the development of these actions. In the exchange of teachers and researchers, those at renowned, internationally reputable institutions will be given priority, with the aim of increasing the visibility of the program.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
MATHEMATICS	5

Justification

The postgraduate program in Mathematics at UFPE was started in 1968 offering a master's degree program in Mathematics. As a consequence of its success and the growth of the qualification and scientific production of the faculty of the department, the Doctorate in Mathematics course was created in 1986. Both have been very well evaluated by CAPES since their inception. The scientific production of the Department of Mathematics places it among the best in the country in its field. This proposal is presented by members of the research group in nonlinear differential equations of the Department of Mathematics of UFPE. In spite of being relatively recent and including several young researchers, the group has a well disseminated body of work with publications in extremely competitive journals of high visibility and impact, among which are Analysis and PDEs, the Journal of Scientific Computing, Advances in Computational Mathematics, Journal of Differential Equations, SIAM Journal on Applied Mathematics, SIAM Journal on Control and Optimization, Proceedings of the American Mathematical Society, Royal Society of Edinburgh Proceedings A (Mathematics), Comptes Rendus Mathematique, Zeitschrift für Angewandte Mathematik und Physik (ZAMP) , ESAIM Control Optimization and Calculus Variations, among others. The group maintains active collaborations with researchers from different institutions abroad, in countries such as the USA, France, England, Italy, Austria, Chile, Spain, and Colombia. This proposal will therefore strengthen these already existing collaborations, as well as allow new collaborations to be initiated as the project is implemented, increasing the degree of internationalization of the program through scientific missions and exchange programs.

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
PHYSICS	7

Justification

The Post-Graduate Program of the Department of Physics at the Federal University of Pernambuco (PGPDP) is recognized as a program on par with its international peer institutions according to the CAPES rules and has achieved an evaluation of 7, which is the top of the scale. A non-tangible example of the degree of internationalization of the program can be understood by the fact that the International Year of Physics, held in 2005, had the closing ceremony held at UFPE, under the coordination of the Physics Department, with the presence of the winner of the Nobel Prize in Physics, Claude Cohen Tannoudji, who is an emeritus professor at UFPE. In the period 2013–2016, the PGPDP carried out 26 projects in collaboration with international institutions). Two other relevant facts that indicate the level of internationalization of the Department of Physics and its graduate program: (a) in the document "Inventing a Better Future: A Strategy for Building Capacities in Science and Technology," which reports successful experiences associated with strategies to develop sustainable science and technology, found at (http://goob.free.fr/iup/Biologie_Moleculaire/Rapport%20Interacademic%20Council.pdf), specific mention is made of the Department of Physics (box 23, page 54 of the document) as "A Brazilian regional center of excellence in Physics"; More recently, in 2013, the Institute of Physics Publishing (Bristol, UK) published a special edition "Science, Impact Annual Review 2013" with the theme "A Special Report on Physics in Brazil". The Physics Department is widely mentioned in the magazine's 11 articles (see http://mag.digitalpc.co.uk/fvx/iop/scienceimpact/brazil2013). This PGPDP project, built with a view to the near future, proposes a joint research effort meeting international standards on a diversity of topics of global relevance and impact, which will certainly open new perspectives on the internationalization of multidisciplinary research based on physics developed in our program, with special emphasis on our students, who will be exposed to highly qualified international institutions abroad, and our program by hosting high-level scientists from reputable institutions to interact locally on common research problems, as well as sharing their expertise on areas of research. Mobility is the driving force of this project.

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
ELECTRICAL ENGINEERING	5

Justification

In 2009, the PGPEE began a more effective and directed collaboration on basic scientific topics and technological innovations in the areas of Microwave, Terahertz, and Photonics with research groups from Spain, specifically the Catalan Communications Technology Center - CTTC - (Polytechnic University of Catalonia [PUC); of the Division of Electrical Engineering of Chonbuk National University - CBNU, Jeonju, South Korea; Emerging Device Technology - EDT - Group, University of Birmingham, Birmingham, England; the Department of Electrical Engineering at Imperial College London and the Department of Bioengineering at McGill University, Montréal, Canada. This 9-year collaboration was facilitated by the approval of some international cooperation projects financed by institutions in Brazil and abroad. With this more effective collaboration, researchers in the institutions involved have always sought bilateral or multilateral funding. So far there have been 3 exchanges of PhD students in exchange programs in Spain, England, and Canada, as well as missions of researchers from the Photonics Group in Spain, Canada, England, and South Korea, as well as visits to PGPEE institutions involved in this cooperation, where among these activities mini-courses and workshops with the participation of local researchers, for the students of the PGPEE. Also, this year another doctoral student should carry out a 1-year exchange program within the same line of cooperation in CTTC - Spain and two teachers of the group are scheduled to carry out missions in Spain (CTTC) and South Korea (CBNU). This project of the Photonics Group of the PGPEE aims to maintain the synergy of collaboration and expand this collaboration to include new research groups in institutions where the exchange of actions still requires further strengthening. This will be achieved through the development of research that is already underway and with new proposals, which will include the completion of 4 sandwich doctorates, and the accomplishment of four missions of the local researchers involved, in the form of 3 senior visiting professors and one mission for a period of between 2 and 4 weeks. In addition, scientific exchange visits are planned for the researchers who collaborate in this initiative, coming from CTTC, McGill, CBNU and Imperial College

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Theme

STATE AND SOCIETY IN GLOBAL CONTEMPORANEITY: DYNAMICS OF INEQUALITY AND DEVELOPMENT

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
SOCIOLOGY	6

Justification

The theme of inequality and development, in its most varied aspects, is one of the main objects of sociology in Brazil and in the world. In the proposals presented by the Post-Graduate Program in Sociology (PGP-Sociology) at UFPE, linked to the lines of research - Theory and Social Thought; Rural social processes and new trends in agriculture; and Identities and Political Culture, Collective Identity and, Social Representations - the theme appears as a central analytical axis articulating theoretical issues and empirical research in the scope of knowledge production and training of researchers. The proposal "The reception of Bourdieu's work in Brazilian sociology" takes as its subject one of the greatest analysts of social inequality of the last century, which inspired much research in the sociology of culture, rural sociology, and Brazilian social theory. According to some of the preliminary results of the research carried out in the country, these areas will receive particular attention because they have been identified as the preferred domains of diffusion of the French author's thought in Brazil, which will allow engaging many teachers and students in the program. The proposal "Globalization of agriculture and social inequalities: Public Policies, Food, Working Conditions, and Gender Relations" continues internationalization activities that reflect the permanent concern of the PGPS with the training of researchers and production of knowledge in this area. The proposal "The postcolonial in the Portuguese-speaking world and the place of African literatures in "world literature" emphasizes the analysis of the limits of possibilities of theories produced, from the processes of decolonization, to account for the cultural production, notably the literature in Portuguese, in spaces of power and domination. All proposals are anchored in ongoing exchange processes.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
SOCIAL WORK	6

Justification

The Post-Graduate Program in Social Work (PGPSW) is focused on Social Work, Social Movements, and Rights. All the lines of research are inscribed in the central theme of the Project. These are: State, Social Policies, and Social Work Action; Social Work, Action, and Social Issues; Social Work, Political Action and Collective Subjects; Social Work, Ethics, and Human Rights; Social Relations of Gender, Generation, Race, Ethnicity, and Family and Contemporary Capitalism, Environmental Issues, and Social Work. The experience of the PGPSW started with the completion of three full doctorates in the 1980s and 1990s and has expanded since the 2000s with the completion of exchange programs and postdoctoral fellowships abroad by its student body and its teaching staff. One of the most significant developments of the PGPSW has been its capacity to attract the attention of researchers and professors abroad to carry out academic activities in our Program, such as teaching courses and mini-courses, offering lectures, authoring and co-authoring articles and books, etc. That is, within a decade, the PGPSW / UFPE went from a "passive internationalization" perspective to another one of "active internationalization," marked by the construction of research networks and exchange programs with researchers from universities and research centers in Africa, Europe, and Latin America involved in this project. In all the regions mentioned, the faculty has focused its studies and research on the themes of development, inequality, and confrontation of contemporary socio-political expressions and phenomena that reconfigure the state / society relationship, particularly in the peripheral countries of the global south.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
POLITICAL SCIENCE	6

Justification

The PGPPS presents expertise in the areas of study on the State, society, inequality, and development, with special participation in the scholarly community working on corruption. The PGPPS presents international publications and ongoing partnerships for the development of research on the subject. For example, Professor Marcus Melo is internationally recognized for his studies on corruption in Brazil. Similarly, Professor Nara Pavão wrote her doctoral thesis on the subject and has published on corruption in international high-impact journals. Professor Mariana Batista is currently involved in a research project on corruption funded by the Massachusetts Institute of Technology (MIT, USA) and has published a paper on the subject. Professor Dalson Figueiredo's international project on corruption in Brazil has recently been approved with funding from the University of Nottingham, UK. Professor Marcelo de Almeida Medeiros, who has long been working on European and Latin American regionalism - has begun research on the issue of trans-border corruption and the role of foreign policy as a vector for the expansion of illicit acts. Our peer institution (University of Oxford) has a direct interest in the development of research on this subject. For example, Professor Timothy Power co-edited the book "Corruption and Democracy in Brazil: the struggle for accountability." In addition, the University of Oxford currently houses the Center for the Study of Corruption and Transparency which brings together academics, anti-corruption experts, and public managers to discuss the effectiveness of accountability tools. Thus, the strong correspondence between the substantive interests of the national team and the foreign collaboration network increases the innovation potential of the PGP's proposal. This is a pioneering proposal and represents an unprecedented collaborative effort among high-level international institutions in the study of corruption in Brazil.

Theme
INNOVATION IN HEALTH

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
BIOLOGICAL SCIENCES	5
Justification	

The Post-Graduate Program in Biological Sciences (PGPBS) was created in 1994 to meet the academic and technical-scientific needs of the northeastern region and the high demand in the State of Pernambuco for the training of PhDs with a multidisciplinary profile in the field of Biological Sciences at the frontier of knowledge of human health. The PGPCB is characterized by a transdisciplinary approach to the biological and health sciences and the like. The PGPCB, reaching a Capes level of 5, is one of the pillars of UFPE and Northeastern Brazil, with a faculty that works in the basic and applied areas of medicinal chemistry and pharmaceutical nanobiotechnology, besides those essential for diagnosis, prospecting of new biologically active molecules and therapeutics of various diseases. The major motivation, besides the installed competence in innovation in health, is the internationalization of the program, which started in 1994 with collaborations with universities in France, Paris VII, Grenoble, and Paris-Sud (UPSud), and expanded to other countries: Argentina, Canada, Chile, Cuba, Denmark, Scotland, Spain, Holland, Italy, Luxembourg, Mexico, Portugal, and Uruguay. This project is presented in the context of a long, consolidated and fruitful 24-year collaboration between PGPBS and UPSud-Saclay in the area of nanobiotechnology applied to health, with uninterrupted projects supported by CAPES-COFECUB. The first project (1994–1998), on physicochemical interfaces applied to nano-systems for drug release, followed by other projects in the area of pharmaceutical nanobiotechnology. The partnership between PGPBS and UPSud has generated 9 publications in scientific periodicals with high impact factors; 4 PhD theses, one in co-tutelage (PGPNANO-UFPE), and two doctorates who are now UFPE professors; 3 UPSud visiting professors at UFPE; courses taught annually by Dr. Vauthier (1994–2015) for students of the PGPBS, PGP Pharmaceutical Sciences, and other UFPE PGPs; and more than 20 Brazil-France and France-Brazil work missions. The UFPE x UPSud partnership was extended to UFRN and UFMG. The last CAPES-COFECUB project (2012–2016) generated 9 publications with a high impact factor; 5 PhD theses, four in co-tutelage and one doctorate candidate who is now a post-doc at UFPE since 2015. This history of collaboration between UFPE and UPSud clearly demonstrates the scholars' ability to interact using different materials, both synthetic and derived from Brazilian fauna and flora applied to nanobiotechnology, such as pharmaceuticals, lectins, polysaccharides, and oils.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
GENETICS	4

Justification

The proposed project integrates a set of researches initiated in a doctoral thesis (2011–2015) by the Post-Graduate Program in Genetics (PGPG) of the Federal University of Pernambuco (UFPE), under the guidance of Dr. Antonio Carlos de Freitas (professor of PGPG), whose previous activities allowed a partnership with institutions of reference in anti-HPV vaccination. Funded by the Foreign Doctoral Exchange Program (Process 1068 / 41-3) of CAPES and Student Mobility Assistance (Process AMD-0144-2.00 / 14) of FACEPE, in addition to support from PRONEM 2014 (APQ -0562-2.02 Process / 14), PGPG initiated a new line of research in the field of development of therapeutic immunization against human papillomavirus type 16 (HPV16), based on the E5 gene (Cordeiro et al., 2015, http: //dx.doi.org /10.4161/hv.34303), at the Istituto Nazionale Tumori Regina Elena (IRE) in Rome, Italy under the supervision of Dr. Aldo Venuti. In order to continue this research, it was submitted to the Call for Projects MEC / MCTI / CAPES / CNPQ / FAPS - Special Visiting Researcher Grant (PVE-2014), proposed for the development of new genetic immunization strategies against papillomavirus 401305 / 2014-7), and approved, allowing the arrival of Dr. Aldo Venuti to the Laboratory of Molecular Studies and Experimental Therapy (LMSET-UFPE), coordinated by Dr. Antonio Carlos de Freitas. Recently, two new projects were approved, one related to the Internationalization of the PGPs in Pernambuco financed by FACEPE (Public Notice 01/2017; Process APQ-0229-2.02 / 17) and another one Financing Research directly related to the objectives of this proposal via FACEPE-PPSUS (Research Project Directed to the Unified Health System, APQ-0748-2.02 / 17).

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
TROPICAL MEDICINE	5

Justification

The Graduate Program in Tropical Medicine (PGPTM) is a reference in the formation of inter and multidisciplinary human resources that seek the scientific and / or technological knowledge existing here, to face national and international health problems. It includes experience in diversified research of permanent professors, encompassing the areas of Infectious and Parasitic Diseases, Immunology, Microbiology, Parasitology, Virology, Epidemiology, and Public Health. It makes possible studies integrating clinical area research with basic / experimental areas, highlighting fungal and bacterial resistance / virulence among the 7 lines of research of the Program. The PGPTM is rated a 5 by CAPES and has research funded by the Ministry of Health, CAPES, CNPq, FACEPE, and the World Health Organization. The program covers research prioritizing the production and biological and physico-chemical evaluation of natural and synthetic products, including bioactive compounds capable of reversing fungal and bacterial resistance. In addition, through collaborations and partnerships signed, the crystallographic and structural properties of macromolecules are characterized, as well as the execution of pre-clinical in vitro and in vivo tests for the development and inclusion in the market of new drugs and treatments with antimicrobial potential. Accordingly, research from the PGPTM uses proteomic techniques to detect microbial resistance and to determine peptide sequences related to such resistance mechanisms, allowing the discovery of so-called biotechnological drugs. The proteomics compose the advances in the framework of the development of the current generation of drugs. The process of research and development of these drugs is closely related to medicinal chemistry. According to the International Union of Pure and Applied Chemistry, medicinal chemistry "involves the invention, discovery, planning, identification, preparation, and interpretation of the molecular action mechanism of biologically active compounds" applied to the research and development process. In this way, it is clear that PGPTM prioritizes and consolidates fundamental interfaces between biological, pharmaceutical, chemical, physical, and computational sciences. These studies and their interfaces guide the discovery of remarkable therapeutic formulations with social and economic benefits.

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
THERAPEUTIC INNOVATION	5

Justification

The main objective of the Postgraduate program in Therapeutic Innovation (PPGTI) is to qualify professionals, researchers, and professors in an interdisciplinary and multidisciplinary way with high scientific level, to formulate, plan and develop independent and innovative research projects, new methodologies, technological products and patents. The goals will be reached through the valorization of the technical-scientific competence installed in Pernambuco, synergized by highlighted national and international collaborations of the Program staff. Among these collaborations, we can highlight those carried out with France, the United States, Germany, England, Scotland, South Korea, Switzerland, Portugal, Canada, and others. PPGIT has been developing diverse scientific activities related to the segment of pharmaceuticals, medicines and other strategic health inputs. In addition, the main objectives of the program are related to the balance between the academic dimension and redefinitions that are currently operating in the world at the levels of spatial, social and political relations. In this context, the main aims of the PPGTI scientific strategy are: 1) Fundamental and applied research in rational planning for the development of innovative health products; 2) New technologies for the population's health, with emphasis on drugs, medicines, vaccines, and diagnostics; 3) Development of projects in modeling, planning, synthesis and structural analysis of new bioactive compounds; 4) Pre-clinical development of bioactive products in the search of new health technologies for in vitro and in vivo applications; 5) Obtaining new products during the basic research phase, aiming to evaluate safety, efficacy, acceptability, and confidence parameters; 6) Evaluate the effects of the development of new drugs and essential health supplies on people, societies and economies, these effects being different in time and space; 7) Values and structures evaluation that result from the articulation between endogenous and exogenous factors that interact themselves resulting in different ways to innovations reaction; 8) Evaluate different reactions, access and forms of appropriation of technological innovations and their impacts on people, society and territory. In this context, PPGTI strategy and its RD&I activities are focused on Health-Innovation.

Theme

SYSTEM MODELING

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
ELECTRICAL ENGINEERING	5

Justification

The Federal University of Pernambuco (UFPE) has research groups with outstanding productivity working on the topics "Signal Processing" and "Communications," in the area of Electrical Engineering. The possibility of expanding the internationalization actions surrounding these groups should enhance the work that has been developed so far. Expanding internationalization would be extremely relevant to the promotion of integrating the work of scholars at the PGPEE with that of other groups and universities and with earning greater visibility abroad for UFPE.

Postgraduate Program	Capes evaluation (2017 evaluation's grade)
PRODUCTION ENGINEERING	7

Justification

UFPE has a number of centers of excellence that develop research of high scientific impact in the area of Production Engineering, presenting advances and innovations in the development of models to support decision making at different levels of the organizations, as well as the planning, management, and optimization of systems producing goods and services. With the support of the PrInt project, the goal is to intensify and expand UFPE's international collaboration network, placing Brazilian research in a competitive position on the world stage. The researchers and collaborators of the Post-Graduate Program in Production Engineering (PGPPE) at UFPE, rated a 7 by CAPES, already have achieved results in terms of collaboration in research at the international level, highlighting the collaboration network formed by INCT-INSID (National Institute of Information and Decision Systems), led by a researcher from the PGPPE at UFPE, who is also coordinator of this PrInt subproject.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
CIVIL ENGINEERING	5

Justification

Current problems of real engineering tend to exhibit high complexity and, therefore, must rely on advanced mathematical models for their analysis. In addition, mathematical modeling is the only option for studying phenomena that cannot be reproduced in practice without generating risks or incurring excessive costs. Mathematical models are developed in an attempt to capture the essential aspects of the problem to be solved. Within the context of Engineering, they are typically based on the physics of the problem. These models hardly come to analytical solutions, thus requiring the help of numerical methods. Today, the current computational resources, together with the development of sophisticated tools, help engineers approach practical engineering problems. We commonly employ optimization techniques, quantification of uncertainties, and numerical simulation to obtain an efficient solution to complex engineering projects. This involves the use of sophisticated and modern techniques. The present proposal approaches as one of the focuses the above aspects. The PGP in Civil Engineering has a research group called PadMec (High Performance Processing in Computational Mechanics) whose researchers have a lot of experience in the topic of multidisciplinary optimization and numerical and computational simulation applied to different fields of engineering. The experience of the group is evidenced by the various articles published in major international journals, as well as its activities and collaborations with renowned international groups and industry. In this proposal, this group will be responsible for the line of research in Modeling, Computational Simulation, and Optimization in Petroleum Engineering (MCOPE - "Modeling, Computational Simulation & Optimization in Petroleum Engineering"). The research will focus on developing tools for solving engineering problems involving computer simulation. The work will cover a wide range of numerical simulation applications with high computational cost, such as optimization and analysis of uncertainties.

Postgraduate Program	**Capes evaluation (2017 evaluation's grade)**
COMPUTER SCIENCE	7

Justification

The PGP in Computer Science (PGPCS) is structured based on its academic diversity and the search for participation of all its members individually or in groups. In this way, the PGPCS can be seen as pursuing two main lines of research: (i) Fundamentals, Methods, and Computational Systems and (ii) Informatics and Society. The first line encompasses basic or fundamental research efforts. Typically, it deals with definitions of models and methods, determination of their propositional properties and implementation of computational systems. These advances can be directed in favor of society, which is the focus of the second line of research that deals with relevant problems linked to the real world and with societal repercussions. This is an area in which the PGPCS has had wide-reaching success stories. Basic research generates novelties with respect to ideas, foundations, theories, and systems that may not be immediately incorporated by society. Applied research has the appropriate means to link research and innovation to societal demands. By developing models that change the state of the art and determining their subsequent applications, the PGPCS applies the expertise of its researchers to advance work focused on relevant topics.

Activities Linked to the Themes

Theme

BIODIVERSITY AND CONSERVATION OF NATURAL RESOURCES

Goal

Place UFPE among the top 10 research institutions in the world the for the research Tropical Biodiversity.

Action	Start date	End date
Train UFPE team to be a reference in the Tropical Atlantic in advanced statistical modeling and to be able to provide great advances in the understanding and characterization of the oceanic ecosystems	08/2018	07/2022

Description

Use different training strategies for students and researchers of the UFPE Post-graduate Program in Oceanography (PGPO) on data usage using advanced statistical modeling in partnership with French researchers through: (i) Submission of students and researchers from the PGPO to the IRD France; (ii) Encourage research guided by advisors at both institutions, as well as work by students with scientists with diverse and complementary skills and/or from different institutions/countries; (iii) Organization of the Platform's courses on disciplines to be developed within the proposed themes. These courses will be open to students from non-Brazilian countries. For this purpose, we will interact with the other IJLs in South America and Africa.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Formation of PhDs interuniversity exchange doctorate	0	5	5

Action	Start date	End date
Increase the visibility of PGPFB/UFPE research by drawing foreign researchers and students to study the Brazilian tropical fungi.	08/2018	07/2022

Description

Increase the participation of foreign professors and researchers as collaborating members of the PGPFB/UFPE to be supervisors and co-supervisors of Brazilian doctoral students. Promote the selection of foreign doctoral students for the taxonomic study of fungi in the PGPFB/UFPEs. Initiate the process for official partnership between UFPE and the Dutch partner institution, following the signing of the General Cooperation Agreement between the PGPFB/UFPE and the Westerdijk Institute / University of Utrecht.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Participation of foreign researchers in orientations to students of the program; foreign students program; agreements.	0	3	7

Action	Start date	End date

To create a worldwide reference for researchers trained in the use of innovative technologies and tools to solve questions on the characterization and description of animal biodiversity.	08/2018	07/2022

Description

The action consists in establishing and consolidating an exchange of students and professor-researchers among PGP Biology Animal (PGPAB) and international institutions in Europe and Latin America. The aim is to guarantee and improve research involving the usage of contemporary tools and technologies for the evaluation, characterization, and description of biodiversity. In addition to the research-focused exchange, the action will include short-term assignments to receive foreign researchers who can experience international workshops in the form of mini-courses and lectures at UFPE. Lastly, to conduct workshops in the area to evaluate the research projects of those students enrolled in the PGPAB-UFPE program.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the training of PGPAB staff using innovative tools and technologies for the characterization of biodiversity.	Few trained Staff	Partially Trained Staff	All Qualified and Trained
Quantitative	Publish work in publications with a high impact and international relevance.	0	4	8
Quantitative	Send doctoral students working on the study of Biodiversity abroad to carry out an interuniversity exchange internship.	0	4	7
Quantitative	Foreign language courses taught by foreign researchers/professors of the PGPAB around the theme of the program**.**	0	3	5
Qualitative	Training students developing the work of PGPAB in the description and characterization of biodiversity in innovative technologies.	0	50%	100%
Quantitative	Short-term international missions of PGPAB professors to consolidate international collaboration.	0	1	2
Quantitative	Receiving international researchers to establish and / or consolidate collaboration with professors of the PGPAB.	0	3	5
Quantitative	Organization of a thematic school for the evaluation of research projects of students enrolled in the PGPAB-UFPE.	0	1	2

Action	Start date	End date
Increase the visibility of PGPFB/UFPE research by drawing foreign researchers and students to study the Brazilian tropical fungi.	08/2018	07/2022

Description

Increase the participation of foreign professors and researchers as collaborating members of the PGPFB/UFPE to be supervisors and co-supervisors of Brazilian doctoral students. Promote the selection of foreign doctoral students for the taxonomic study of fungi in the PGPFB/UFPEs. Initiate the process for official partnership between UFPE and the Dutch partner institution, following the signing of the General Cooperation Agreement between the PGPFB/UFPE and the Westerdijk Institute / University of Utrecht.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Participation of foreign researchers in orientations to students of the program; foreign students program; agreements.	0	2	4

Action	Start date	End date
Expand the usage of current molecular and bioinformatics tools (including the latest generation sequencing -NGS) in systematic, phylogeographic and molecular cytogenetic studies.	08/2018	07/2022

Description

The latest sequencing platforms, such as Illumina, have revolutionized large-scale molecular data collection, enabling the usage of NGS sequencing in a wide scale of studies. This approach allows a greater range of precision in phylogenetic and phylogeographic analyses. Now, instead of using an average of three regions of chloroplast, it is possible to use the plastoma (plastidial genome) entirely. Hence, hundreds of loci, including nuclear ones, can be analyzed in an expanded, often populational, sampling. Complex characterization groups, due to the short time of divergence or marked radiation, for example, require a larger data set to be analyzed in an integrated way for more accurate readings. New collaborations will be established in this area, with the best collaborations consolidated during the final years of study. Participants will be newly admitted professors in the PGPBV, who will have the opportunity to participate in a foreign exchange program (for Junior Visiting Professors), foreign Young Talent, as well as interuniversity exchange doctoral students

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Proportion of theses in studies of systematics, phylogeography, and molecular cytogenetics using NGS.	20	30	50

Action	Start date	End date

Guarantee the training of UFPE personnel involved in Brazilian research on fungal taxonomy using a polyphase approach, this will greatly improve expertise in the country	08/2018	07/2022

Description

Train UFPE students and researchers in a polyphasic study on Brazilian fungal diversity with the collaboration of partner institutions Westerdijk Institute (Netherlands), University of Minho (Portugal) and University of La Frontera (Chile). This will encourage interuniversity doctoral studies and also promote short-term missions of foreign researchers in the PGPFB / UFPE to study fungal material in-loco, promotion of disciplines (courses), lectures, and mini-courses.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Execution of interuniversity doctoral studies and missions of researchers at UFPE and foreign institutions.	0	6	13

Action	Start date	End date
Guarantee the training of UFPE personnel involved in Brazilian research on fungal taxonomy using a polyphase approach, this will greatly improve expertise in the country	08/2018	07/2022

Description

Train UFPE students and researchers in a polyphasic study on Brazilian fungal diversity with the collaboration of partner institutions Westerdijk Institute (Netherlands), University of Minho (Portugal) and University of La Frontera (Chile). This will encourage interuniversity doctoral studies and also promote short-term missions of foreign researchers in the PGPFB / UFPE to study fungal material in-loco, promotion of disciplines (courses), lectures, and mini-courses.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Execution of interuniversity doctoral studies and missions of researchers at UFPE and foreign institutions.	0	8	12

Goal

Placing UFPE among the 10 main research institutions in the world in the use and conservation of Biodiversity and Natural Resources of Tropical Environments.

Action	Start date	End date
Train UFPE researchers to be national and international practitioners of 3D imaging (in porous medium) using X-ray computed tomography.	08/2018	07/2022

Description

Sending doctoral students and professors/researchers to the University of Guelph, Canada (in the area of 3D imaging / X-ray computed tomography) in order to undertake doctoral interuniversity studies and short-term missions. Also, to host visiting professors from the University of Guelph to deliver research, lectures, and mini-courses at UFPE

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Lectures from University of Guelph professor	0	4	6
Quantitative	Short-term missions at University of Guelph	0	1	2
Quantitative	Mini-courses by University of Guelph professor	0	2	3
Quantitative	PhD students sent to University of Guelph	0	2	2

Action	Start date	End date
Creating a worldwide reference point for researchers focused on the application of tools and innovative technologies that promote the usage and conservation of Animal Biodiversity in Tropical Environments.	08/2018	07/2022

Description

The action consists of encouraging the training and education of researchers from the PGP in Animal Biology (PGP-AB) group to solve national problems of sustainability through the conservation of biodiversity and natural resources. This training will involve the creation of specific workshops to use the different tools and technologies proposed in our internationalization projects. These workshops will be organized in the form of special topics taught in a foreign language, with a target audience of students and professors from PGPAB and other UFPE graduate programs in related fields.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Short-term international missions of PGPAB professors to consolidate international collaboration.	0	1	2
Qualitative	To improve the training of professors of the PGPAB to apply innovative technologies and tools for biodiversity conservation.	Few trained Staff	Partially Trained Staff	All Qualified and Trained
Quantitative	Send doctoral students abroad to participate in an interuniversity doctoral exchange scholarship program.	0	4	7
Quantitative	Realization of a thematic school for the evaluation of research projects for students enrolled at PGPAB-UFPE with projects aimed at such action.	0	1	2
Quantitative	Hosting international researchers to establish and / or consolidate collaboration with professors of PGPAB.	0	2	5
Quantitative	Generate publications in journals of high impact and international relevance.	0	4	8
Quantitative	Conduct foreign language courses taught by foreign researchers/professors of the PGPAB on the themes of the program.	0	3	6
Quantitative	Train students of the PGPAB developing work on the conservation of biodiversity in the use of innovative technologies and tools.	0	50	100

Action	Start date	End date
Extend long-term ecological network surveys	08/2018	07/2022

Description

Long-term ecological research is fundamental to understanding how anthropogenic disturbances affect tropical diversity at different levels. Studies should be carried out at population, community, and ecosystem levels, addressing issues in an integrated way across the various disciplines. Long-term ecological research offers a unique opportunity to enhance collaboration and international scientific partnerships through international biodiversity monitoring networks (I.e. ILTER, PELD).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Proportion of theses focused on the usage and conservation of Biodiversity based on long term ecological studies.	30	40	60

Action	Start date	End date
Train UFPE researchers for the national and international report in biodegradation of recalcitrant pollutants and metagenomic analysis of environmental samples.	08/2018	07/2022

Description

The data comparison process is based on the sustainability of soil, groundwater, and surface water. PhD training in conducting experiments for biological treatment with microcosms requires corresponding training in high-precision analytical methods that aid understanding. A large gap lies in the lack of understanding of the function of microorganisms in biological treatment systems, which are performed with the metagenomic analysis of the identification of genes in microbial communities. Thus, UFPE researchers will be trained in high precision analytical techniques in the area of chromatography and metagenomic analysis applied to environmental samples. They will also gain microcosm training, techniques of molecular analysis in molecular biology, knowledge of limiting factors of metabolic tracing, identification of metabolic pathways, and understanding of the composition and function of the microorganism of the reactors and on self-oxidized compounds. Studies of fundamentals will involve tracing metabolic pathways with identification of the intermediate compounds using isotopes. The missions of foreign researchers in Brazil are planned to provide a course on the subject of ‘degradation of recalcitrant pollutants and treatment technologies’. The evaluation of interuniversity exchange doctoral scholarships, planning of collaborative scientific production, structuring of new projects and funding sources, detailing of theses.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	PhD interuniversity exchange in co-supervision at the University of Arizona (UA).	0	1	2
Quantitative	PhD interuniversity exchange in co-supervision at the University of Toronto	0	1	1
Qualitative	Mission abroad for the evaluation of advanced doctoral programs, gathered scientific production planning and structuring of new projects.	Mission recently held at the University of Arizona. Selected Mission for the months of June and July at the University of Toronto	Missions held at the Universities of Toronto and Autonomous University of Madrid	Missions in All Partner Universities (UofT, UA, Madrid and Ruhr of Bochum).
Quantitative	PhD interuniversity exchange in joint supervision and with dual degrees at the Autonomous University of Madrid (UAM).	1	2	2
Qualitative	Carry out a UFPE holiday-period course with the participation of partner institutions.	Beginning of a vacation-period course	Holiday course held in July / 2020	Vacation Course accomplished.
Quantitative	PhD interuniversity exchange in co-supervision with the Ruhr University of Bochum (Germany).	0	0	1

Action	Start date	End date
Train UFPE students and researchers to be a source of expertise (in the Tropical Atlantic) in marine acoustics, biologger, and natural markers.	08/2018	07/2022

Description

TAPIOCA will strengthen collaboration between Brazil and France to allow the usage of natural markers to evaluate fish movements and patterns of connectivity between marine environments; with an aim to identify essential habitats for marine species (e.g., breeding grounds. This work will describe the structure of marine food chains; evaluate the processes of allocation of resources among captured species, identify sources of mercury contamination and quantify their accumulation in marine organisms in the Northeast of Brazil. As previously identified: (i) expand availability of videoconference access to master's degrees in France, for example, in the Master's Degree in 'Aquatic Bioreactors in Mediterranean and Tropical Environments' (BAEMT) at the University of Montpellier; (ii) Organize international multidisciplinary summer schools on Tropical Marine Science.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Exchange of teachers and doctoral students.	0	4	8

Action	Start date	End date
Train UFPE researchers to be a national and international reference in ecohydrology / biogeochemical carbon cycling in the semi-arid and the reactive transport of pollutants in the soil-aquifer system.	08/2018	07/2022

Description

Send students and researchers who work in the areas of ecohydrology / biogeochemical carbon cycling (in the semi-arid region of Pernambuco and in the reactive transport of mixtures of pollutants in the soil-aquifer system) to IGE, IRD, and ENTPE in France to undertake an interuniversity exchange including doctorates and short-term missions. Receive visiting professors from IGE, IRD, and ENTPE for research, lectures, and mini-courses at UFPE.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	IGE, IRD, and ENTPE missions.	0	1	3
Quantitative	Mini-courses of professors from France	0	1	3
Quantitative	Lectures by French teachers.	0	2	6
Quantitative	PhD students for IGE, IRD, and ENTPE.	0	1	2

Goal

Establish at UFPE a center for strategic thinking for the sustainability of tropical ecosystems, generating quality knowledge and support for the establishment of public policies.

Action	Start date	End date
Institute a group of researchers to work with the various environmental and public management bodies for the formulation, execution and monitoring of public policies for sustainability.	08/2018	07/2022

Description

The action consists in promoting the training and upskilling of researchers from the PGPAB to integrate teams responsible for the formulation, execution, and monitoring of national public policies focused on environmental sustainability, as well as on the use of fauna and its ecosystem. This action will focus on promoting the usage of research results focused on strategies, technologies, and innovative tools for biodiversity assessment and conservation to foster these public policies, making them more effective and feasible.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	To incorporate teachers into the core of strategic thinking on the sustainability of tropical ecosystems.	0	At least 3 teachers identified and working at the center	At least 6 teachers identified and working at the center
Qualitative	To train students from the PGPAB (and other interested PPPs from UFPE) to interpret and use research results to adequately promote public environmental sustainability policies.	0	At least 10% of PGPAB students trained	At least 20% of PGPAB students trained
Quantitative	Sending doctoral students abroad to carry out an interuniversity exchange scholarship.	0	1	2
Quantitative	Generate publications aimed at scientific dissemination and in the form of technical reports for managers and decision makers	0	2	4

Action	Start date	End date
Expand the participation of ecological studies in the formulation of public policies.	08/2018	07/2022

Description

Long-term ecological research is fundamental to support Sustainability studies. These integrated studies, approaching the themes from a socio-ecological perspective, will give support to the formulation of public policies. This action is essential to consolidating UFPE's place as a core center in the sustainability of tropical regions, training qualified professionals to deal with the major challenges posed by global change, and generating scientific expertise for global audiences.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Proportion of theses with socio-ecological approach	30	40	60

Action	Start date	End date
Gather Brazilian and French scientists to study physical, biogeochemical, ecological, and human dynamics in Northern & Northeastern Brazil and fill the scientific, technological and methodological gaps of the Interuniversity Platform.	08/2018	07/2022

Description

The TAPIOCA Project proposes to develop a platform with the aim of providing the necessary training in order to analyze ecosystem acoustics and the vertical measurements of the turbulent microstructure. The TAPIOCA Interuniversity Platform is intended, in the medium term, to become a reference (in the western tropical Atlantic) in the use of the French-American Surface and Ocean Topography (SWOT) satellite to be launched in 2021. SWOT is set to be a watershed for hydrology and oceanography, with its altimeter capable of monitoring the lakes, rivers, and deep and coastal oceans to a 1km scale, complementing conventional satellite altimetry sampling (SWOT, 2012).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Encourage academic innovation at the graduate and undergraduate level in relation to courses, schools, teaching of foreign language, as well as aiming to promote the international visibility of research and graduate programs	Courses with low innovation and reduced international project visibility	Courses with moderate innovation character and international visibility of projects amplified.	Courses with a high innovative character and research projects with high international visibility.
Quantitative	Scientific and technological results linked to the action (articles, books, patents, etc.)	0	10	20
Quantitative	Exchange of teachers and doctoral students.	0	4	8

Theme

INNOVATION IN BASIC SCIENCES

Goal

To strengthen and consolidate the production of knowledge and research carried out at UFPE, promoting partnerships and connections in strategic international networks through an academic mobility program.

Action	Start date	End date
Mobility, scientific exchange and capacity building for the design and development of new sensor and telecommunications devices.	08/2018	07/2022

Description

Joint research, mobility of researchers and students for scientific and technological development aimed at: • Design of innovative configurations and applications of nanodevices and plasmid MEMs in the near infrared region • Research on reconfigurable filters, resonators and interdigital structures in the micro-wave region • Development of frequency selective surfaces (FSS) for THz applications

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	PhD thesis concluded without interuniversity exchange program	0	0	2
Quantitative	Visiting Teachers in Brazil from the CTTC-Spain, CBNU-South Korea and Imperial College, England, stay between 2 and 3 weeks each	0	3	3
Quantitative	Mini-courses and workshops by Visiting Teachers from CTTC-Spain, CBNU-South Korea in Brazil and Imperial College, England	0	6	6
Qualitative	PhD thesis in progress with 6-month interuniversity exchange program at CBNU, South Korea	0	0	1
Quantitative	Articles presented at international conferences of impact in the field of study	0	8	16
Quantitative	2 to 4-week mission to CBNU - South Korea	0	0	1
Quantitative	Two Visiting Professors with a total stay of 8 months in CTTC-Spain	0	1	2
Quantitative	Articles in high-impact international journals in the field	0	4	8
Quantitative	Master's Dissertation completed at PGPEE- UFPE	0	2	5
Quantitative	PhD thesis concluded with 12-month interuniversity exchange program at CTTC, Spain	0	0	2

Action	Start date	End date
Mobility of teachers and post-graduate students from DF-UFPE to study abroad while enabling teachers from foreign institutions to visit DF-UFPE.	08/2018	07/2022

Description

Joint research, exchange of researchers (and students) for scientific and technological development and mini-courses and workshops on the following topics: #1 Finding New Solutions on Field Theory and General Relativity #2 Investigation into the solid-liquid transition for two-dimensional structures with symmetry square in the presence of density gradients #3 Atomic Physics and Quantum Optics #4 Collective neuronal phenomena: collective oscillations and criticality #5 Spintronica, spin glasses, amorphous and disordered materials, including NanoMagnetism and micromagnetic simulation #6 Tradeoffs, division of Tasks and Evolution of Complexity #7 Nonlinear and Biophotonic Photonics #8 Quantum Networks in Cold Nitrogen Clouds #9 New topological structures in superconductors and chiral magnets.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Short-term missions of lecturers abroad	0	12	24
Quantitative	Mini-courses and workshops of Visiting Professor in Brazil	0	9	18
Quantitative	PhD thesis concluded without interuniversity exchange program	0	12	24
Quantitative	Articles in international conferences of impact in the area	0	200	400
Quantitative	Master's Dissertation completed	0	20	40
Quantitative	Training in short courses abroad	0	2	4
Quantitative	Visiting Professor in Brazil	0	9	18
Quantitative	Articles in high-impact international journals in the field	0	90	180
Quantitative	PhD thesis concluded with interuniversity exchange program	0	2	5

Action	Start date	End date
Mobility of researchers from the Mathematics Department of UFPE and researchers from the Free University of Amsterdam	08/2018	07/2022

Description

Send teachers and PhD students (if feasible) to the Free University of Amsterdam to visit Prof. Victor Caldas and advance an Interdisciplinary project. To receive Prof. Victor Caldas at the Department of Mathematics, UFPE to collaborate with the researchers and students of the Mathematics department.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the capacity of the Qualitative team in the area of Interdisciplinary research	There is an initial collaboration of Prof. Victor Caldas with Prof. Fernando Nóbrega	Preparation and submission of articles to be considered for publication in quality journals, training human resources, and further deepening interdisciplinary research in the program.	Publication of articles in journals of international prestige, consolidation of the research area, training of human resources, and preparation of future projects.

Action	Start date	End date
Expand the interaction among teachers and students with their peers in different countries through the strengthening of groups already established alongside the consolidation of new groups and lines of research.	08/2018	07/2022

Description

Provide travel for UFPE professors and students to institutions abroad. Encourage the presence of students and professors (from international institutions) to bring their experiences to UFPE in order to reach a greater number of Brazilian students and teachers who do not have the opportunity to study or work abroad.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Visits and mini-courses taught by foreign teachers at UFPE	0	2	3
Quantitative	Visits of PGP-QUI teachers to institutions abroad	0	4	6
Quantitative	PhD students sent to institutions abroad	0	2	2

Action	Start date	End date
Mobility of researchers from the Mathematics Department of UFPE and the Institute of Higher Research at the University of Tarapacá.	08/2018	07/2022

Description

Send teachers and PhD students to the Institute of Higher Research at the University of Tarapacá to visit Professor Marko Rojas-Medar, a leading academic in the field. Receive Prof. Marko at the Mathematics Department at UFPE to collaborate with the researchers and students of the Department of Mathematics.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the capacity of the team in the area of theoretical analysis of asymmetric incompressible fluids.	There has been previous collaboration between Professors Pablo Braz e Silva, Felipe Wergete Cruz, Miguel Loayza, and Professor Marko Rojas Medar	Preparation and submission of articles to journals of international prestige and continued collaboration, further establishing the area of Analysis of incompressible asymmetric fluids among the specializations at UFPE	Publication of articles in internationally renowned journals and preparation of new projects for the following years.

Action	Start date	End date
Exchange of students and teachers for the strengthening of skills in the field of optical biosensors with the usage of nanoparticles.	08/2018	07/2022

Description

Joint research, mobility of researchers and students for scientific and technological developments aimed at: • Exploration of new conceptions, configurations, and applications in the area of localized surface plasmas (LSPR) spectroscopy in nanoparticles • Development of new protocols suitable for the usage of LSPR in biosensors • Development of new computational analysis tools

Action – Indicator				
Type	**Indicator**	**Current Situation**	**2nd Year Goal**	**Final Goal**
Quantitative	Visiting Professor for a period of 3 months at McGill University, Canada	0	0	1
Quantitative	Visiting Professor at McGill University in Brazil, staying from 2 to 3 weeks	0	1	1
Quantitative	Mini-courses and workshops by Visiting Professor at McGill University (Canada) in Brazil	0	2	2
Quantitative	**:** Master's Dissertation completed at PGPEE- UFPE	0	0	1
Quantitative	Articles presented in international conferences of impact in the field	0	4	8
Quantitative	Articles in high-impact international journals in the field	0	2	4
Quantitative	PhD thesis concluded at PGPEE-UFPE, with a 12-month interuniversity exchange program at McGill University, Canada	0	0	1
Quantitative	PhD thesis concluded at PGPEE-UFPE, without interuniversity exchange program	0	1	2

Action	Start date	End date
Mobility of researchers from the Department of Mathematics at UFPE and University College Cork (UCC, Ireland).	08/2018	07/2022

Description
Send teachers to University College Cork (UCC, Ireland) to visit Prof. Dr. David Henry, internationally renowned for his work on Water Waves. To host Prof. Dr. David Henry at the Mathematics Department at UFPE to collaborate with the researchers in the department and deliver a lecture(s).

Action – Indicator				
Type	**Indicator**	**Current Situation**	**2nd Year Goal**	**Final Goal**
Qualitative	Improve Water Waves research in the Mathematics Department at UFPE	A previous collaboration between Prof. Dr. Silvia Sastre-Gómez and Prof. Dr. David Henry has already occurred.	Preparation and submission of articles for publication in internationally respected journals and to continue with the collaboration, expanding knowledge in the area of Water Waves to achieve an even more complete qualification.	Publication of articles in internationally prestigious journals and preparation of new projects for the following years.

Action	Start date	End date
Researchers mobility of the Mathematics Department of UFPE and Université Clermont-Auvergne	08/2018	07/2022

Send teachers and PhD students to the Université Clermont-Auvergne to visit Prof. Arnaud Münch, internationally renowned for work in the area of Numerical Analysis. To receive Prof. Arnaud Münch at UFPE to collaborate with researchers and students in the Department of Mathematics; mini-course on numerical approximations of EDP solutions.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the capacity of the team in the area of Numerical Analysis	There was a prior collaboration between Prof. Diego A. Souza and Prof. Arnaud Münch.	Preparation and submission of articles to journals of international prestige and continued collaboration, further deepening Numerical Analysis.	Publication of articles in internationally renowned journals and preparation of new projects for the following years.

Action	Start date	End date
Increase the number of publications of the Program in extract A of QUALIS-CAPES through the exchange and training of students.	08/2018	07/2022

Description

To improve the interactions between foreign researchers and UFPE through the development of joint research strategies aimed at increasing the quality of publications, especially in the Qualis A1 track, through scientific missions involving the preparation of manuscripts and dissemination of new techniques and approaches (lectures, seminars, short courses).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	PhD students sent to institutions abroad	0	2	6
Quantitative	Visits and mini-courses taught by foreign teachers at UFPE	0	1	3
Quantitative	PGP-QUI post-doctorate teachers at institutions abroad	0	1	2

Action	Start date	End date
Mobility of researchers from the Mathematics Department of UFPE and researchers from the Universities of Oxford and York, England.	08/2018	07/2022

Description

Send professors and PhD students (if feasible) to Oxford University to visit Profs. Eamonn Andrew Gaffney, leader in the area of Mathematical Biology. Receive Profs. Eamonn Andrew Gaffney (Oxford) and Hermes Gadelha (York) at the Mathematics Department at UFPE to collaborate with researchers and students.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve team capacity in Mathematical Biology	There was a prior collaboration of Prof. Eamonn Gaffney, of Prof. Hermes Gadelha with Prof. Fernando Nóbrega	Preparation and submission of articles to be considered for publication in internationally renowned journals.	Publication of articles in internationally renowned journals and preparation of new projects for the following years

Action	Start date	End date
Mobility of researchers from the Mathematics Department at UFPE and Université de Tours, France	08/2018	07/2022

Description

Receive Dr. Emmanuel Chasseigne from the Université de Tours (France), internationally renowned in the area of Hamilton-Jacobi equations, to the Mathematics Department at UFPE to collaborate with researchers from the department and deliver a lecture.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the capacity of the team in the Optimum Control area	There has been previous collaboration between Prof. Silvia Sastre-Gomez and Prof. Emmanuel Chasseigne.	Preparation and submission of articles to be considered for publication in internationally renowned journals and continued collaboration, expanding knowledge in the area of optimal control to achieve additional training.	Publication of articles in internationally renowned journals and preparation of new projects for the following years.

Action	Start date	End date
Mobility of researchers from the Mathematics Department at UFPE and researchers from the University of Lorraine, Nancy, France	08/2018	07/2022

Description

Send teachers and PhD students to the University of Lorraine to visit Professor. Bertrand Berche and Sebastein Fumeron, from the Statistical Physics Group, at the University of Lorraine, Nancy. Receive Professors Bertrand Berche and Sebastien Fumeron at UFPE to collaborate with researchers and students in the Department of Mathematics.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve team capacity in Applied Mathematics	There was a prior collaboration between Professors Bertrand Berche, Sebastien Fumeron, and Fernando Nóbrega	Preparation and submission of articles for publication in internationally renowned journals.	Publication of articles in internationally renowned journals and preparation of new projects for the following years.

Action	Start date	End date
Joint courses and short courses promoted by international institutions and the Graduate Program in Chemistry at UFPE.	08/2018	07/2022

Description

Promote seminars, short courses, and full courses in relevant areas in English, in addition to student and teacher exchange. A pioneering and rather successful experience in the Post-graduate Program in Chemistry involved a course (60 hours) in the post-graduate school taught in English by teleconference by Prof. Dr. Roberto D. Lins of dQF-UFPE and Prof. Dr. Brian H. Lower of Ohio State University (OSU). This event was funded by OSU. In light of past and ongoing experiences, it is also expected that foreign teachers will be able to teach part of the subjects, short courses, and lectures at UFPE (in person and by teleconference) with the participation of foreign students and UFPE graduate students, especially in Chemistry and Material Science.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Mini-courses and lectures given by a foreign researcher through teleconference	0	2	6
Quantitative	Mini-courses and conferences given by PGP-QUI researcher via teleconference	0	1	3

Action	Start date	End date
Mobility of researchers from the Mathematics Department of UFPE and universities of MinParis Tech and Université de Strasbourg.	08/2018	07/2022

Description

Send teachers and PhD students to the University of Strasbourg and MineParis Tech to visit Professors Vilmos Komornik and Lionel Rosier both leaders in the field of Control theory. Host Professors Vilmos Komornik and Lionel Rosier at UFPE to collaborate with researchers and students in the Department of Mathematics.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve team capacity in the area of Control theory	There is a previous collaboration with Prof. Roberto Capistrano-Filho with Profs. Vilmos and Lionel Rosier	Preparation and submission of articles for journals of international prestige and continue with the collaboration, further development in the area of Control Systems dispersive EDPs.	Publication of articles in internationally prestigious journals and preparation of new projects for the following years

Action	Start date	End date
Mobility of researchers from the Mathematics Department at UFPE and the University of Seville.	08/2018	07/2022

Description

Send teachers and PhD students to the University of Seville to visit Professors Enrique Fernández-Cara and Manuel González-Burgos, Rosier both leaders in the field of Control theory. Receive Profs. Enrique Fernández-Cara and Manuel González-Burgos at UFPE to collaborate with the researchers and students of the Mathematics Department

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve team capacity in the control area	There was a prior collaboration between Prof. Diego A. Souza and Professors Enrique Fernández-Cara and Manuel González-Burgos.	Preparation and submission of articles for internationally prestigious journals and continue with the collaboration, deepening understanding in the area of EDP Control Systems.	Publication of articles in internationally prestigious journals and preparation of new projects for the following years.

Action	Start date	End date
Mobility of researchers from the Mathematics Department and universities Virginia Tech and University of Cincinnati, United States.	08/2018	07/2022

Description

Send Doctoral students to the University of Cincinnati and Virginia Tech to visit Professors Bingyu Zhang and Shuming Sun both leaders in the area of Harmonic Analysis and good placement of dispersive systems. Professors Bingyu Zhang and Shuming Sun will also be hosted by the Mathematics Department at UFPE to collaborate with researchers and students. Seminars related to the project will be presented at both visits.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Improve the capacity of the team in the area of Harmonic Analysis and good placement of dispersive systems.	There was a prior collaboration between Prof. Roberto Capistrano-Filho and Professors Bingyu Zhang and Shuming Sun.	Preparation and submission of articles for journals of international prestige and continue with the collaboration, further study in the area of Harmonic Analysis and good placement of dispersive EDP's.	Publication of articles in internationally prestigious journals and preparation of new projects for the following years.

Theme

STATE AND SOCIETY IN GLOBAL CONTEMPORANEITY: DYNAMICS OF INEQUALITY AND DEVELOPMENT

Goal

To problematize theoretical references that deal with the place of cultural production in spaces of power and domination, with emphasis on literature produced in Portuguese.

Action	Start date	End date
Expand the participation of teachers and students in the process of internationalization concerning reflections on post-colonial studies and world literature, as well as cultural productions in the Portuguese language	08/2018	07/2022

Description

Exchange of professors and PhD students from the PGPS / UFPE, made possible through a Senior Visiting Professor Exchange Scholarship and PhD scholarships for work abroad. Invitation to professors of foreign institutions participating in the project to be visiting professors at UFPE.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Publication of Books and chapters nationally and internationally	0	1	1
Quantitative	Expand the number of articles submitted for publication in national and international journals	0	3	6
Quantitative	Lectures and conferences held by foreign teachers	0	2	4
Qualitative	Systematize the state of the art of the issues being researched	None	Partial Studies	Complete Diagnoses
Quantitative	Present scientific communications at national and international events	0	4	8
Quantitative	Masters and PhD training	0	2	6

Goal

Investigate the reception, in Brazil, of the work of sociologist P. Bourdieu from a comparative perspective involving the United States, Argentina, and Mexico within the international project Pierre Bourdieu et les Amériques.

Action	Start date	End date
Intensify the participation of teachers and students in the international research network formed around the work of Pierre Bourdieu.	08/2018	07/2022

Description

Exchange of professors and PhD students fom the PPGS / UFPE, made possible through Senior visiting professor abroad, PhD scholarship sandwiches abroad, scholarship bag visiting professor from abroad and scientific mission. Invitation to teachers of institutions participating in the project for research meetings, lectures and conferences in the UFPE

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Organize national and/or international events	1	2	6
Qualitative	Systematize the state of the art of the issues being researched	None	Partial Studies	Complete Diagnoses
Quantitative	Expand the number of articles submitted for publication in national and international journals	0	4	12
Quantitative	Present scientific communications at national and international events	0	4	12
Quantitative	Publish Books and chapters nationally and internationally	0	2	6

Goal

Examine changes resulting from the globalization of food on the organization of production and labor.

Action	Start date	End date
Intensify the participation of teachers and students in the research network Globalization of Agriculture.	08/2018	07/2022

Description

Exchange of professors and doctoral students from PGPS / UFPE, through interuniversity exchange doctoral scholarships, a Visiting Senior Professor program, and Visiting Junior Professor. Invite professors from foreign institutions to participate in the project via the ‘Visiting Professor Scholarship’, as well as Brazilian and other foreign Post-Doctoral scholarships.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Present scientific communications at national and international events	0	4	12
Quantitative	Increase the number of articles submitted for publication in national and international journals	0	3	12
Qualitative	Systematize the state of the art of the issues being researched	None	Partial Studies	Complete Diagnoses
Quantitative	Organize / create national and international events in partnership with peer institutions	0	2	6
Quantitative	Increase the number of books and chapters published in national and international journals	0	2	6

Goal

Develop high quality knowledge and impact in the area of corruption

Action	Start date	End date
To consolidate interinstitutional scientific cooperation networks among researchers working on Corruption**.**	08/2018	07/2022

Description

Promote the exchange of ideas and researchers with a common objective of studying the causes and effects of corruption. This promotion will take place through the development of joint research between UFPE and the University of Oxford. The consolidation of the network foresees the formation of a research group, involving researchers, teachers, and students from both institutions. Through this group it will be possible to present co-authored works, propose long-term research, and construct indicators and databases (to be made publicly available).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Qualitative	Consolidate UFPE as a key global center in Corruption studies**.**	not reached	Partially achieved	Completely achieved
Quantitative	Presentation of papers in areas focusing on corruption research	0	8	16
Quantitative	Publications in high-impact journals focusing on corruption research	0	6	12
Quantitative	Publication of books to disseminate the results of the collaborative research	0	1	2

Action	Start date	End date
Promote the exchange of teachers and students between partner institutions	08/2018	07/2022

Description

Promote the exchange of doctoral students, junior professors, and senior professors and UFPE through mobility actions such as interuniversity exchange doctoral scholarships, fellowships of junior visiting researchers and fellowships for senior visiting researchers, as well as funding for short-term missions. To promote the hosting of researchers from the University of Oxford through short missions. These activities will encourage the circulation of ideas and the construction of collaborative work, supporting the goal of producing high-impact and high-quality training at the doctoral level

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Participation of Oxford University professors in regular post-graduate courses at UFPE	0	2	4
Quantitative	Post-doctoral achievement by UFPE junior researchers	0	2	3
Quantitative	Lectures by Oxford University professors at UFPE	0	4	8
Quantitative	Participation of Oxford University professors in doctoral boards	0	3	6
Quantitative	Realization of an interuniversity exchange doctoral program for UFPE students at Oxford University	0	5	10
Quantitative	Post-doctoral achievement by UFPE senior researchers	0	1	2

Action	Start date	End date
Train teachers and students to use quantitative and qualitative techniques in the study of corruption.	08/2018	07/2022

Description

Train teachers and students at UFPE in the use of methodological tools in both quantitative and qualitative areas. Methodological training has great potential for short, medium, and long-term impact by providing students and teachers with skills that can be used to develop quality research in several areas of knowledge. Training will be provided through short-term courses taught by Oxford University professors and also with the participation of UFPE teachers and students in internationally recognized short courses such as the IPSA summer school and the Michigan Methods School.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Participation of UFPE professors in training courses in the area of methodology	0	2	4
Quantitative	Participation of UFPE students in training courses in the area of methodology	0	2	4
Quantitative	Teacher training courses at Oxford University at UFPE	0	2	4

Goal

Produce critical knowledge about the relationship between development and inequality, identifying macro-societal dynamics and sociopolitical phenomena that affect the relationship between the state and society.

Action	Start date	End date
Train team to be a national authority in the field of development and inequality and facilitate debates in relation to the global South	08/2018	07/2022

Description

Perform descriptive-analytical and comparative research aimed at elaborating explanatory frameworks for issues related to democracy, human rights, social struggles, labor, human mobility and exploitation of wealth. – Promote the intellectual production of high-impact teachers and students and international inclusion in the production of knowledge on the topic and in related areas of the program, its lines of research and the expertise of its permanent faculty, ensuring a level of excellence. Our aim is to build innovation, processes and mechanisms with intermediate and immediate impacts on the training of new researchers able to dialogue with national and international institutions in the sphere of their area of knowledge. – We aim to exchange experiences focused on the socio-economic and political situations of the countries involved by conducting interuniversity exchange doctorates, young talent with experience abroad, junior visitor professor abroad, visiting professor abroad, visiting professor in Brazil, and work missions.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Elaborate articles for publication in national and international journals	0	4	12
Quantitative	Organize national and/or international events	0	2	6
Quantitative	Publish books and chapters of national and international repute	0	2	6
Quantitative	Present scientific communications at national and international events	0	4	12
Qualitative	Systematize the state of the art of issues being researched	None	Partial Studies	Diagnoses Complete

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Theme

INNOVATION IN HEALTH

Goal

Make UFPE an international reference in research, development, and innovation and in the training of practitioners in therapeutic and diagnostic innovation for rare disease(s)

Action	Start date	End date

To transform UFPE into a world reference in the use of innovative technologies for the development and evaluation of miniaturized systems for label free bio-detection of rare disease(s).	08/2018	06/2022

Description

The action aims to find solutions to the global health problem associated with the increasing incidence of autoimmune diseases, such as systemic sclerosis (SS), through the development of a new generation of tools that can substantially improve the efficiency of therapy and diagnosis, as well as prove more accessible to the population. In addition, the project will be directed at the miniaturization of SS diagnosis based on lab-on-a-chip systems. To this end, we will use microsystem technology, microelectronics and nanostructured materials for the purpose of integrating sensor-actuator elements and micro analytical systems within the space of the device. As a result of this development, a portable biosensor prototype will be presented for fast and multiparametric identification of SS. Microarrays will be obtained through electronic engineering coupled with the biochemical principles of molecular bio-reacquisition. Thus, this action has a focus on nanotechnology for biosensors intended for clinical applications, self-assembling applications and the interface between biology and semiconductors. The device will be characterized by a low power consumption, with a total analysis time of 3-4 hours, integrated smart modules, including a data processing system, integrated standard library and telemetry line. Alongside its social significance, the commercial potential of this project is high due to a high demand for new diagnostic methods for SS. For the optimization and implementation of the SS diagnosis method in nanotechnology-based platforms, partnerships will be developed with the Institut des Sciences Analytiques - Université Claude Bernard Lyon and University of Leeds. For this, work assignments will be carried out by national and international teachers / researchers. Finally, researchers from UFPE will be trained to be a national and international reference in the development of nanostructured biodevices for the diagnosis of rare disease (s).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Participation in international conferencees	0	3	3
Quantitative	Work missions by Senior Visiting Professor: Brazil-France	0	0	0
Quantitative	Brazil-England short-term mission	0	1	1
Quantitative	Work assignments by Senior Visiting Professor: Brazil-England	0	1	1
Quantitative	Mobility of international visiting researcher England-Brazil	0	0	0
Quantitative	Short-term missions: Brazil-France	0	1	1
Quantitative	Doctorate interuniversity exchange (PDSE)	0	1	1
Quantitative	Mobility of the international visiting researcher France-Brazil	0	1	1
Quantitative	Publication of articles in high-impact international journals	0	3	3
Quantitative	Drafting of an application and filing of national and international patents	0	1	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4

Goal

Acting on translational research related to Health Innovations for rare disease(s) placing UFPE among the best in the world

Action	Start date	End date
Create at UFPE a world reference center in pre-clinical in vitro tests of bioactive products.	08/2018	07/2022

Description

Currently, the treatment options for many rare diseases are limited. Systemic sclerosis is a rare disease, its treatment has little impact on the progression of fibrosis, which represents the main pathophysiological feature of the disease. As a consequence, demand for new therapeutic alternatives is extremely high. Therefore, UFPE will become a reference center for the immunomodulatory and antifibrotic evaluation of new molecules. The action will be carried out in partnership with researchers from the Paris Descartes University. Work assignments will be carried out by national and international professors / researchers, as well as the training of qualified human resources.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctorate interuniversity exchange (PDSE)	0	1	2
Quantitative	Work missions by Senior Visiting Professor: Brazil-France	0	1	1
Quantitative	Mobility of the international visiting researcher	0	1	1
Quantitative	Publication of articles in high-impact international journals	0	1	3
Quantitative	Participation in international conferences	0	2	4
Quantitative	Brazil-France Mission	0	1	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4

Action	Start date	End date
Create at UFPE a world reference center in pre-clinical trials in in-vitro bioactive products in search of new technologies for rare disease (s)	08/2018	07/2022

Description

The animal models include complementary tools for in vitro and ex-vivo tests, allowing for better clarification of the mechanisms involved in the pathophysiology of the disease and also more detailed evaluations for the discovery of new therapeutic alternatives. Today, there are animal models of rare disease induced by chemical molecules or genetic alterations, which reflect the heterogeneous mechanisms of the disease and thus allow for the carrying out of tests prior to clinical trials. UFPE will become an in-vitro evaluation center for immunomodulatory and antifibrotic action. The action will be carried out in partnership with researchers from the Paris Descartes University. Work assignments will be conducted by national and international professors/researchers, as well as training of qualified practitioners.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange Program (PDSE)	0	0	2
Quantitative	Mission Brazil-France	0	0	2
Quantitative	Applying for and filing international and national patents	0	0	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Host of international visiting researcher	0	0	1
Quantitative	International conference attendance	0	0	4
Quantitative	Publication of articles in high-impact international journals	0	0	3
Quantitative	Work missions undertaken by a senior visiting professor: Brazil-France	0	0	1

Goal

Development of therapeutic strategies against lesions associated with papillomavirus infection in an innovative pre-clinical model related to HPV16.

Action	Start date	End date
Monitoring, consultancy, and technical-scientific transfer of expertise of the IRE on the subject	08/2018	07/2022

Description

Monitoring, consultancy, and technical-scientific transfer of expertise of the IRE on the subject

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Elective subject PGPG	0	0	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Attending international and national conferences	0	2	3
Quantitative	Evaluation and planning adjustments	0	0	1
Quantitative	Publication of articles in high-impact international journals	0	2	3
Quantitative	Hosting an international associate researcher	0	0	1

Action	Start date	End date
Production of HPV vaccine antigens on heterologous platform of plants/Lemna	08/2018	07/2022

Description

Production of HPV vaccine antigens on heterologous platform of plants/Lemna

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Publication of articles in high-impact international journals	0	2	3
Quantitative	Obtaining recombinants producing E5 and E7 protein	0	0	2
Quantitative	Doctoral student exchange program toward international collaboration	0	0	1
Quantitative	International and national conference attendance	0	2	3
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	3

Action	Start date	End date

Evaluation in preclinical trials of antigen constructs for genetic immunization with MHC-I binding epitopes predicted in silico based on the products of the oncogenes E5, E6, and E7	08/2018	07/2022

Description

Evaluation in preclinical trials of antigen constructs for genetic immunization with MHC-I binding epitopes predicted in silico based on the products of the oncogenes E5, E6, and E7

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Performed pre-clinical trial	0	2	2
Quantitative	International and national conference attendance	0	2	3
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Publication of articles in high-impact international journals	0	2	5
Quantitative	Doctoral exchange program for students to participate in international collaboration	0	1	2

Action	Start date	End date
Explore the potential of different molecular immunomodulators, such as the co-expression of the I-PADRE peptide, for the induction of CD4 helper response, on the proposed vaccine formulations	08/2018	07/2022

Description

Explore the potential of different molecular immunomodulators, such as the co-expression of the I-PADRE peptide, for the induction of CD4 helper response, on the proposed vaccine formulations

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Publication of articles in high-impact international journals	0	2	3
Quantitative	Potentializing the effect of the three DNA vaccines	0	1	3
Quantitative	International and national conference attendance	0	2	3
Quantitative	Doctoral exchange program for students to participate in international collaboration	0	1	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4

Action	Start date	End date

Construction of plasmids, HPV antigens and adjuvant immunomodulators in bacterial system for the different proposals of immunotherapy against HPV16	08/2018	07/2022

Description

Construction of plasmids, HPV antigens and adjuvant immunomodulators in bacterial system for the different proposals of immunotherapy against HPV16

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Publication of articles in high-impact international journals	0	2	5
Quantitative	Doctoral exchange program for students to participate in international collaboration	0	1	4
Quantitative	International and national conference attendance	0	1	3
Quantitative	Constructions obtained	0	6	6

Action	Start date	End date
Construction of plasmids for the system of heterologous expression of HPV vaccine antigens on heterologous platform of plants/Lemna	08/2018	07/2022

Description

Construction of plasmids for the system of heterologous expression of HPV vaccine antigens on heterologous platform of plants/Lemna

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Plasmids constructions obtained	0	2	2
Quantitative	Doctoral exchange program for students to participate in international collaboration	0	0	1
Quantitative	International and national conference attendance	0	2	3
Quantitative	Publication of articles in high-impact international journals	0	2	3

Goal

Place UFPE among leading institutions worldwide in training of qualified human resources in health innovations through partnerships with research institutions of international excellence.

Action	Start date	End date
Doctoral School of Innovation in Health	08/2018	07/2022

Description

In addition to the scientific results and their value, we propose that this collaboration establish an international course of education - Doctoral School of Innovation in Health - dedicated to students interested in health innovation in different aspects of the production chain: from diagnostic to therapeutic, including pharmaceutical nanobiotechnology, nanodevices for diagnosis, new materials with health applications, DNA vaccines, development of new pharmaceutical raw materials, amongst others. In addition to the technical-scientific aspects of health innovation, valorization and patenting activities will be addressed also. Such a course could go beyond classroom lectures offered by foreign researchers on mission at UFPE to include a Brazilian team or guests, also in courses with videos, discussion forums, teleconferences, etc.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4

Action	Start date	End date
Train UFPE researchers to become national and international references in the development of new nanostructured diagnostic platforms.	08/2018	07/2022

Description

The relevance of this action is associated with the high societal demand for a fast, effective, and easily accessible diagnostic method. The diagnostics shall be performed in nanostructured platforms that will be integrated into a network of sensors, including bioconjugate sensors, projected following the principles of micro and nanoelectronics. Recent advances in material chemistry, especially with the introduction of various nanomaterials, along with the launch of new transduction protocols, and bio-recognition elements, are behind huge developments in ultra-sensitive and multiplexed analyses of a wide range of biomarkers of diseases. Firstly, nanostructured impedimetric biosensors and optical sensors shall be developed, customized to identify with reliability the markers for SS. Accordingly, methods will be implemented that aim to use green chemistry as a sustainable strategy of viable applicability in the area of biosensors, using techniques for the covalent bond of antigens for the detection of Systemic Sclerosis, limited (ESl) and diffuse (ESd) to the nanoparticulated systems. The attachment of electrochemical techniques and optical tools for the detection of antibodies of clinical importance characterizes the multiple systems which shall be developed for this proposal. For the enhancement and implementation of the methodology of SS diagnosis in platforms based on nanotechnology shall be performed alongside partnerships with the Institut des Sciences Analytiques - Université Claude Bernard Lyon 1 and University of Leeds. Thus, this action focus on nanotechnology for biosensors for clinical applications, self-assembly applications and on the interface between biology and semiconductors. There shall be working missions by national and international professors/researchers, as well as the qualified human resources training.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Mobility of the international visiting researcher England-Brazil	0	2	2
Quantitative	Mobility of the international visiting researcher France-Brazil	0	0	0
Quantitative	Dissertation of a request and filing of international and national patent	0	1	1
Quantitative	Work missions undertaken by senior visiting Professor: Brazil-France	0	1	1
Quantitative	Short term missions: Brazil-France	0	1	1
Quantitative	Short term mission Brazil-England	0	1	1
Quantitative	Publication of articles in high-impact international journals	0	3	3
Quantitative	International conference attendance	0	3	3
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Work missions by senior visiting Professor: Brazil-England	0	0	0
Quantitative	Doctoral Exchange Program (PDSE)	0	1	1

Action	Start date	End date
Training of human resources in economic efficiency analysis and evaluation of the cost-effectiveness of technological solutions for rare diseases**.**	08/2018	07/2022

Description

The Unified Health System (SUS) grants free medical care necessary in the treatment of disease, providing universal public health services to all Brazilians and residents. A cost-benefit assessment is essential before the implementation of new technologies in the SUS system, since health resources are scarce. Consequently, it is expected that health policy decisions be based on economic studies aimed at improving the quality of life of the patient and minimizing treatment costs, aiming overall at greater system efficiency. In addition, the high cost of this disease is associated with the outpatient clinical and hospital levels in health systems around the world. Nevertheless, there is a shortage of information about the cost of treating Systemic Sclerosis (SS), and those available are transversal or retrospective in nature, with a small number of patients. It should be emphasized, however, the lack of studies into the cost to SUS of treating this disease in Brazil. Given the peculiarity of the disease, and the high costs involved in its treatment, it is essential to analyze the economic costs. The development of this action shall allow a comparison of costs of hospitalization, outpatient services, surgical procedures, and medicines, relating the new technological solutions offered in the present project with existing ones. Additionally, it is necessary to act in response to the need to measure the economic efficiency of the I) development of new therapeutic alternatives to SS through the evaluation of immunomodulatory and antifibrotic activity of new thiazolidine derivatives in systemic sclerosis and in experimental models; and of the II) development of new alternatives for the diagnosis of SS through the development of a miniaturized diagnostic platform destined for the diagnosis of Systemic Sclerosis through the integration of microsystem technology, microelectronics, and nanostructured biosensors to identify the disease in human samples. Work missions shall be undertaken by Brazilian and international professors/researchers, and training of qualified human resources will be provided.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Work missions undertaken by senior visiting Professor: Brazil-Canada	0	0	1
Quantitative	Mobility of visiting researcher (Canada-Brazil)	0	0	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Doctoral Exchange Program (PDSE)	0	0	1

Goal

Develop new generation tools to improve the diagnostic effectiveness and therapy of diseases through innovation in health by a highly specialized human resources

Action	Start date	End date
Develop reference center of pre-clinical trials of bioactive product safety in UFPE	08/2018	07/2022

Description

The non-clinical safety trials during the developments of medication is considered a step towards the safety probation of new pharmaceuticals Such evaluations can be done through in vitro or in vivo methods (Guidelines for Conducting Non-Clinical Studies of Toxicology and Pharmaceutical Safety Required for Drug Development, ANVISA) The safety of TZDs derivatives exhibiting antifibrotic and immunomodulatory activities in vitro and in vivo shall be evaluated. This action shall be accomplished alongside researchers from the Paris Descartes University. Work missions shall be undertaken by national and international professors/researchers, as well as the qualified human resources training.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Mission Brazil-France	0	0	1
Quantitative	International conference attendance	0	0	3
Quantitative	Publication of articles in high-impact international journals	0	0	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Dissertation of a request and filing of international and national patent	0	0	1

Goal

Strengthen the internationalization and training of human resources in the areas of biotechnology and health chemistry at the PGPBS aiming at health innovation

Action	Start date	End date
Design of self-active nano-medication	08/2018	07/2022

Description

Nanotechnology-based drugs have been designed for controlled release drugs up to date. Therefore, they are designed to conceal the physio-chemical properties and the inadequate biological properties of drugs, mere active small molecules, by introducing desired properties to target organs/cells. Alternatively, this project proposes a modern concept that consists of "bioactive nanomedicine". The driving idea is to use the concepts of synthetic biology and construct micro or self-active nano-objects, not necessarily using an existing drug. A true change in paradigm in which nanomedicine becomes self-active. For instance, UPSud team has been developing micro and nano-platelets flattened capable of grouping polysaccharides on their surface. Through the modulation of the topology of the surfaces (geometry, chain density, flexibilities, etcetera), various biological activities mediated by the nature of polysaccharides can be achieved. Exemplifying, it has been shown that agglomeration of chitosan can induce the antiparasitic activity of the nanoparticles. These systems were patented (Bouchemal, UPSud) and a subsidiary company was launched to explore this concept (Biokawthar Technologies), demonstrating unequivocally the interest of this innovative concept. According a similar concept, also intend to develop self-active nano-medication and its application in the circulating tumor cells treatment (CTCs) in the blood compartment. CTCs which escape primary tumors are believed to be responsible for the spread and development of metastases in distant organs of the body. The main objective is to develop suitable nano-medications to simultaneously capture and destroy these cells during their circulation into the bloodstream. In summary, such nano-objects shall be based on the assembly of suitable nanobodies (small fragments of antibodies of camelids) grafted into flexible polymeric structures. The goal comprises the preparation and characterization of nano-medication (molecular interactions using techniques such as Surface Plasmon Resonance - SPR, microcalorimetry - ITC and fluorescence), as well as their ability to selectively and specifically recognize tumor cells in the complex blood matrix. Biological activities shall be tested on in vivo and cellular breast cancer models.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange program held	0	1	1
Quantitative	Scientific missions accomplished: 1 Brazil-France; 1France-Brazil	0	2	2
Quantitative	Doctoral School of Innovation in Health held at UFPE	0	2	4
Quantitative	Works published	0	2	3
Quantitative	International conferences attendance	0	2	2
Quantitative	Applying for and filing patents	0	1	1

Action	Start date	End date
Development of innovative bioactive compounds with health promotion activities: synthesis of new drugs	08/2018	07/2022

Description

The heterocycle pyrimidine is known in therapeutic chemistry due to the richness of its pharmacological potential: anti-inflammatory action (Falcão, 2006), anticonvulsant, anti-HIV (Lee-Ruff, 1996) and analgesic, besides use in the treatment of diabetes, hypertension and cardiac arrhythmia (Anderson et al., 1945; Luna et al., 2011; Xavier, 2012). There are reports in the literature that pyrimidine derivatives have potential trypanocidal activity (Dias et al, 2009). In this context, we synthesized previously unpublished pyrimidines and functionalized pyrimidines with potentially bioactive imide. Motivated by a relentless pursuit for new potentially active compounds associated with accumulated experience in the chemistry of pyrimidine derivatives and the richness of the pharmacological potential of these molecules, we propose to obtain pyrimidine derivatives by conventional synthesis and by means of microwave irradiation to perform research with advanced objectives, to meet the standards of green chemistry, without the use of organic solvents. A comparative analysis between the two methodologies shall be performed, considering the yield and reactivity. The aim is to obtain new molecules with pharmacological potential, to synthesize a series of new pyrimidines and imide functionalized pyrimidines potentially bioactive and their subsequent encapsulation in nano-structured systems for in vitro and in vivo evaluation of efficacy.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	International conferences attendance	0	1	1
Quantitative	Doctoral Exchange program held	0	1	2
Quantitative	Works published	0	2	6
Quantitative	Scientific missions accomplished: 1 Brazil-France; 1France-Brazil	0	2	2
Quantitative	Doctoral School of Innovation in Health held at UFPE	0	2	4

Action	Start date	End date
Development of innovative bioactive compounds with health promotion activities: bioactive fish waste	08/2018	07/2022

Description

Fishery processing residues are already recognized as a source of molecules with many biotechnological applications. Fish meal hydrolysates and shrimp proteins, carotenoid pigments, and polysaccharides have bioactive properties that not only supply the demand for feed components for aquaculture, as well as potentially refining applications with high added value to commercialization. The Laboratory of Enzymology - LABENZ at the Federal University of Pernambuco, has over 10 years of experience in new technologies for the whole use of fish, aiming at the practical application of these concepts and technologies in the development and sustainability of aquaculture production in Pernambuco and in Brazil. The aim is to optimize and apply the recovery techniques and applications of bioactive molecules with biotechnological potential, extracted from by-products of fishery processing, with local productions with innovative cultivation concepts and commercial applicability. The anticipated impact is the generation of new products and patents while creating subsidies for the strengthening of local productive arrangements with products of high commercial value. Bioactive compounds of interest are enzymes, pigments, polypeptides, polysaccharides, and polyunsaturated fatty acids (PUFAs). The objectives are the recovery and characterization of bioactive molecules (biopolymers) from fishery processing residues (fish and crustacean heads, shells and carcasses) as well as algae extracts with capacity as new compounds for food, cosmetics, and pharmaceuticals.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange program	0	1	1
Quantitative	Application for and filing of patents	0	1	1
Quantitative	International conference attendance	0	2	2
Quantitative	Supervised Postdoc Junior Talent	0	1	1
Quantitative	Works published	0	1	3

Action	Start date	End date
Development of innovative systems for the controlled release of orally administered medication with class II or III drugs of the Biopharmaceutics Classification System (BCS)	08/2018	07/2022

Description

Medications administered orally are very convenient. However, in the vast array of available compounds, many are poorly soluble in water (Class II) or water-soluble drugs, but with low permeability (Class III). Considering the lack of commercial drugs of suitable distribution in the organism, many of these compounds should not be administered orally due to their low or inconsistent bioavailability. This research topic has been recognized in Europe in the launch of the UNGAP COST action (https://pharm.kuleuven.be/pharbio/ungap) by The European Network for Understanding Gastrointestinal Absorption-related Processes (UNGAP), composed by a multidisciplinary network of scientists aimed at advancing the field of intestinal drug absorption. Thereby, the need to develop innovative drug delivery systems capable of increasing concentration in the intestine is recognized as one of the means for improving the absorption of drugs administered orally. Accordingly, the potential of nano-sponges of reticulated cyclodextrins will be investigated for the supply of drugs poorly soluble in water. In fact, cyclodextrins could aid in the encapsulation of drugs poorly soluble in water in the molecular state. Consecutively, the affinity of nano-sponges for the epithelial surfaces of the intestine can be modulated by introducing positive electric charges on the surface of the nano-sponges. The mucoadhesive behavior of these nano-sponges and their ability to increase orally-administered drug absorption shall be supported by both using chamber and in vivo models. Furthermore, pharmacokinetic and biopharmaceutical (PK / PB) modeling could be used to verify different hypotheses of drug action mechanisms in these systems. Doctoral exchange program at UPSud through Capes fellowship (12 months).

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Supervised Postdoc Junior Talent	0	1	1
Quantitative	International conference attendance	0	2	2
Quantitative	Scientific missions accomplished: 1 Brazil-France; 1 France-Brazil	0	2	2
Quantitative	Works published	0	2	3
Quantitative	Doctoral School of Innovation in Health held at UFPE	0	2	4
Quantitative	Doctoral Exchange program	0	1	1
Quantitative	Applying for and filing patents	0	1	1

Action	Start date	End date
Assess the biodistribution of non-spherical nanocarriers in the body	08/2018	07/2022

Description

Although many efforts have been made in recent decades to prepare nanocarriers with a suitable distribution profile (directing to organs/cells versus undesired distribution in organs/cells responsible for side effects), the factors conducting their distribution patterns remain poorly understood. Under a 60-month program (NICE project, supported by BPI France), Dr. Christine Vauthier emphasized the crucial role of the topology of hydrophilic chains generally grafted onto the surface of polymeric nanoparticles to avoid recognition by the immune system and an attempt to control their biodistribution in the organism. Recently, it has been shown that the geometric alteration of nanoparticulated objects could modify its interactions with biological cells and macromolecules. Therefore, there is a need to clarify the role of the shape parameter in the action of nanostructured drugs in the organism. Hence, this objective shall prepare and characterize non-spherical nanoparticles produced with biodegradable polymers to study the impact of their shape on the composition of the protein crown which is formed on their surface when placed in contact with plasma (or other biological means). In fact, it is expected that the radius of curvature of non-spherical nanoparticles to modulate the adsorption of proteins on the surface leads to anisotropic objects with unexpected distributions in the body. In the second phase, the distribution of nanoparticles marked with fluorescence (cyanine's with fluorophores in near IR) shall be systematically evaluated in vivo via animal imaging (mice/rats) following IV administration, using Lumina equipment, purchased by UPSud-Saclay, which has a sophisticated image platform enabling measurement from cells to the human organisms as a whole. To understand the role of the composition of the protein crown on the surface of nanoparticles, the nanoparticles shall be preincubated in the presence of specific proteins in order to generate crowns with known compositions to be used as a control. The ability of these particles to activate the complement system shall also be determined and may serve as a marker of possible acknowledgement by the immune system. Finally, we hope to clarify the role of nanoscale particle shape in the biological recognition processes of the particles.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange program	0	1	1
Quantitative	Scientific missions accomplished: 1 Brazil-France; 1France-Brazil	0	2	2
Quantitative	Doctoral School of Innovation in Health held at UFPE	0	2	4
Quantitative	International conference attendance	0	1	1
Quantitative	Works published	0	1	3

Action	Start date	End date
Development of innovative bioactive compounds with health promotion activities: lectins	08/2018	07/2022

Description

Isolation of lectins in plants with biotechnological potential. Lectins are proteins widely found in plants, exhibiting diverse biological activities and expressive biotechnological potential. These proteins may have different effects on cells of organisms and their antibacterial, antifungal, insecticidal, immunomodulatory, and cytotoxic activities against tumor cells are described in the literature. The increase in the number of antibiotic resistant microorganisms and non-selective toxicity of the chemotherapeutic agents, used to battle cancer, stimulate the search for new drugs. The antibacterial activity of lectins shall be investigated against Gram-positive and Gram-negative species of medical relevance (including strains resistant to antibiotics) and antifungal activity against Candida species, pathogenic to humans. Cytotoxicity shall be determined on human tumor cell lines (Jurkat, T47D, HepG2) and unprocessed (fibroblasts and human peripheral blood cells). The type of induced cell death shall also be assessed. The immunomodulatory action of lectins shall be assessed by the cytokine profile secreted after exposure of human peripheral blood cells to lectins. The objective is to purify and characterize bioactive lectins of native Brazilian plants, with potential applications as new antimicrobial substances, bio-insecticides, and compounds with immuno-stimulatory activity, for site-specific targeting of nanotechnology-based drug systems.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange program	0	1	1
Quantitative	International conference attendance	0	2	2
Quantitative	Works published	0	1	3

Goal

Proteomically characterize specific-sites targeting bioactive molecules derived from cercosporamide with antifungal potential and ability to reverse resistance

Action	Start date	End date
Synthesis and physio-chemical characterization	08/2018	07/2022

Description

Synthesis and characterization of new bioactive molecules, derived from cercosporamide, with anti-Candida potential

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Doctoral Exchange program	0	1	1
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Applying for and filing patents	0	1	1
Quantitative	Number of molecules synthesized	0	10	20
Quantitative	International conference attendance	0	1	2
Quantitative	Works published	0	1	2
Quantitative	Scientific missions accomplished	0	1	2
Quantitative	Visiting Postdoc Jr Professor	0	1	1

Action	Start date	End date
Proteomic and cytometric cell mapping before and after treatment	08/2018	07/2022

Description

Surface mapping of the microorganisms, before and after treatment with molecules derived from cercosporamide, for mass spectrometry, liquid chromatography coupled with mass spectrometry and flow cytometry.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	International conference attendance	0	1	2
Quantitative	Scientific missions accomplished	0	1	2
Quantitative	Applying for and filing patents	0	0	1
Quantitative	The numbers of microorganisms mapped/evaluated according to cellular and macromolecular protein parameters	0	10	20
Quantitative	Doctoral Exchange program held	0	1	1
Quantitative	Works published	0	1	2

Action	Start date	End date
Biological performance of new bioactive molecules derived from cercosporamide with anti-Candida potential	08/2018	07/2022

Description

In vitro evaluation of new bioactive molecules derived from cercosporamide with proven anti-Candida potential

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Number of evaluated molecules	0	10	20
Quantitative	Visiting Postdoc Jr Professor	0	0	1
Quantitative	Scientific missions accomplished	0	1	2
Quantitative	Works published	0	1	2
Quantitative	Applying for and filing patents	0	1	1
Quantitative	Doctoral Exchange program held	0	1	2
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	International conference attendance	0	1	2

Goal

Consolidate international research network in PD&I for health innovations in rare disease(s) allowing the international role of UFPE

Action	Start date	End date
To make the bank of bioactive molecules of UFPE/NUPIT the largest in Latin America and to synthesize molecules with potential activity for rare disease(s) treatment	08/2018	07/2022

Description

The relevance of this action is associated with the society's high demand for new drugs to treat autoimmune diseases. The Center for Research in Therapeutic Innovation (NUPIT) of UFPE aims to contribute to strengthen Brazilian capacity for innovation in the sector of health priority inputs, with emphasis on Drugs and Medicines. The National Chemo-library of NUPIT consists of 1,423 bioactive molecules of the acridine, thiazolidine, imidazolidinyl and benzothiazines series. Additionally, NUPIT performs a translational research, holding the Health-Living bank that groups serum, plasma and DNA samples to assist the pre-clinical researches of new products for rheumatological diseases, including Systemic Sclerosis (ES). Currently, few therapeutical modalities have efficacy in the treatment of ES, the great majority is directed to the symptomatic treatment, mainly for the vascular and immunological aspects, in the absence of agent that demonstrably acts in the progression of fibrosis, which represents the most expressive manifestation of the disease. In this respect UFPE shall train human resources in synthesis and characterization of chemical compounds with potential immunomodulatory and antifibrotic activity as new therapeutical alternatives for ES. For the optimization and implementation of these methods of synthesis of new molecules shall be held partnerships with the Cochin Institute of the Paris Descartes University. For such, exchanges shall be undertaken by national and international professors/researchers and PhD students.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	International conference attendance	0	1	2
Quantitative	Mission Brazil-France	0	1	1
Quantitative	Publication of articles in high-impact international journals	0	2	3
Quantitative	Doctoral School of Innovation in Health at UFPE	0	2	4
Quantitative	Mobility of the visiting international researcher France-Brazil	0	1	1
Quantitative	Dissertation of a request and filing of international and national patent	0	1	1

Theme

MODELING OF SYSTEMS

Goal

Develop new techniques for digital data communication

Action	Start date	End date
To train a team to become regional reference in modeling systems for digital data communication.	08/2018	07/2022

Description

Send students and researchers to internationally renowned institution in the area of Electrical Engineering, in order to hold a doctoral exchange and postdoctoral programs. Furthermore, host internationally renowned researcher in the area, for research period and courses in Brazil

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Professors missions abroad	0	0	1
Quantitative	Doctoral Exchange Program (PDSE)	0	0	1

Goal

Propose, model, develop and implement computational models of the most diverse computing sub-areas

Action	Start date	End date
Strengthen and update the knowledge of the team in the sub-areas mentioned in the description of objectives.	08/2018	07/2022

Description

Send students and researchers to internationally renowned institution in the sub-areas chosen (computer systems engineering; software engineering and programming language; data management and retrieval of information; computer intelligence and artificial intelligence; media and interaction; computer networks and distributed systems; theory and fundaments of computing) for a doctoral exchange program, senior and junior visits. Both exchange and visits can be performed for purposes of proposing and implementing models such as use in contemporary problems This action comprises 60-month for exchanging doctoral, 48-month for senior and another 48-month for junior fellowship programs. Each year there should be at least one exchanging doctoral fellowship, one senior visitor fellowship and one junior visitor fellowship implemented.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	PhD Thesis accomplishment	0	80	160
Quantitative	Increase the number of interested in developing partnerships with our Program	0	4	8
Qualitative	Increase the impact of publications expressed in quotations	0	Double number of quotations	Quadruple the number of quotations
Quantitative	Increase the number of publications with partnerships from renowned international institutions	0	10	20
Quantitative	PhD thesis concluded with exchange program/double degree	0	4	8
Quantitative	Papers published in international journals	0	100	200

Goal

Place UFPE as an international reference in the development and application of tools and techniques for modeling systems and productive processes of goods and services

Action	Start date	End date
Intensify international cooperation and collaboration with researchers from internationally renowned institutions in the area of modeling systems and processes of production of goods and services.	08/2018	07/2022

Description

Send students and researchers to internationally renowned institution to hold a doctorate exchange and postdoctoral programs; as well as perform work mission. Sign formal cooperation agreements alongside leading foreign institutions in the area of system modeling and production processes for goods and services, for the training of highly qualified personnel.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Short-term missions abroad	1	2	4
Quantitative	Short courses taught by foreign professors at UFPE	0	1	1
Quantitative	Visiting Sr. Professor abroad	0	0	1
Quantitative	Doctoral Exchange program (6 months)	2	2	4
Quantitative	Lectures given by internationally renowned researchers at UFPE	2	2	3
Quantitative	Scientific articles in indexed journals of international circulation in co-authored by researchers abroad	5	6	10
Quantitative	Visiting Professor in Brazil (15 days)	1	1	2
Quantitative	Communication in international conferences in support of co-authorship with researchers abroad	3	4	7
Qualitative	Improvement of the scientific impact (contribution) of the results of the research projects developed in collaboration with internationally renowned researchers	regular	good	excellent

Goal

Become a national reference and gain international relevance in numerical simulation in multidisciplinary optimization in Petroleum Engineering

Action	Start date	End date
Exchange program and knowledge exchange	08/2018	07/2022

Description

Improve the research knowledge of one another; access each other's research infrastructure; open new opportunities for collaborative industrial projects; develop new technologies; send students to undertake doctoral exchange programs; provide courses to be taught by the researchers involved in the project and/or through workshops organized to promote the international visibility of the developed research. In both situations, students (at the post-graduate and (under)graduate levels) shall be encouraged to attend. The action comprises a 12-month exchange program fellowship and 14 exchange trips, each lasting 15 days.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Technical visits of Researchers of the Swansea University	0	2	4
Quantitative	Technical visits of Researchers to the University of Texas	0	1	2
Quantitative	Articles in international journals on the theme of the MCOPE proposal	0	9	18
Quantitative	Doctoral Exchange program (months)	0	6	12
Quantitative	Articles in conference proceedings on the theme of the MCOPE proposal.	0	15	30
Quantitative	Technical visits of Researchers to Swansea University	0	2	4
Qualitative	Technical visits by researchers from the University of Texas	0	2	4

Goal

Place UFPE as a world reference in the development of analytical models to support decision making.

Action	Start date	End date
Strengthen the National Institute on Systems of Information and Decision Making (INSID), training and empowering people in advanced decision support tools and techniques.	08/2018	07/2022

Description

Send students and researchers to internationally renowned institution which hold partnerships in the area of production management and operational research to hold doctoral and post-doctoral exchange programs; as well as perform work missions. Welcome international visiting researchers involved in the collaborative projects for the period of research and afford opportunities to have them deliver lectures in Brazil. Sign formal cooperation agreements alongside leading foreign institutions in the area of decision support, for the training of highly qualified personnel, increasing the international visibility of UFPE.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	Visiting Sr. Professor abroad	0	2	3
Quantitative	Visiting Jr Professor abroad	0	1	2
Quantitative	Doctoral exchange program (6 months)	2	5	11
Quantitative	Visiting Professor in Brazil (15 days)	0	1	1
Quantitative	Scientific articles in indexed journals of international circulation co-authored by researchers abroad	2	10	20
Quantitative	Participation in international conferences aimed at co-authoring with researchers abroad	2	9	15
Quantitative	ing in short courses (summer/winter schools) abroad, valid for up to 3 months	0	2	3
Quantitative	Short courses taught by foreign professors at UFPE	1	3	7
Quantitative	Lectures given by internationally renowned researcher at UFPE	1	3	5
Quantitative	Short term missions abroad	2	5	9
Quantitative	Post-doc Exchange Program (6 months)	0	1	1
Qualitative	Improvement in the citation of research	regular	good	excellent

Goal

Develop signal processing techniques applicable to systems modelled by means of graphs

Action	Start date	End date
Train a team to become regional references in systems modeling and signal processing of graphs.	08/2018	07/2022

Description

Send students and researchers to an internationally renowned institution in the area of Electrical Engineering, in order to hold doctoral exchange and postdoctoral programs. Furthermore, host internationally renowned researchers in the area, for a period of research and to teach courses in Brazil.

Action – Indicator

Type	Indicator	Current Situation	2nd Year Goal	Final Goal
Quantitative	International visiting professors	0	1	3
Quantitative	Junior Postdoc	0	0	1
Quantitative	Professors missions abroad	0	1	3
Quantitative	Doctoral Exchange program	0	1	1

STRATEGIES

Strategy for the consolidation of existing international partnerships, as well as the construction of new partnerships and cooperation projects to increase the relationship between the brazilian institution and research groups abroad.

With regard to the consolidation of international partnerships, it is important to note that UFPE already has a high number of collaborations. Of a total of 2510 recent publications (2017/18) in the Scopus database, one third results from international collaborations. UFPE has been developing its international visibility since 2016 through the implementation and translation to English of its new Post-Graduate Program websites (all Programs of grade 5 or higher have a web page in English, and this situation is being extended to all the other PGPs). A second strategy involves the publication and dissemination of a Call for Visiting Scholars, giving priority in the selection process to qualified international human resources in order to stimulate the international academic environment. In the last public Call for Visiting Professors, 2017, more than half of the contracted Visiting Professors originated in Spain, the USA, the Netherlands, and Japan. Cooperation projects are evaluated by different Pro-Rectorates and only receive the approval of the Research Board after verification of the relevance of the partnering foreign institution(s), guaranteeing the quality of the research collaboration. Finally, it is worth noting that in 2015, when UFPE put out a call for visiting researchers, the institution was visited by almost forty researchers from different countries (Holland, Canada, Estonia, USA, United Kingdom, France, Italy, Germany, Portugal, Spain, Chile, South Korea, Australia, and Cuba)

Strategy to attract foreign students to Brazil.

The calls for visiting scholars posted both in Portuguese and English on the new sites of the Post-Graduate Programs (all Programs rated 5 or higher have English websites) besides increasing the institution's international visibility have helped draw foreign students to the institution. A significant part of the Post-graduate Programs has already carried out activities related to hosting students from other countries, which has been increasing the number of foreign students in the master’s and doctoral programs. More than 180 cooperation agreements have been signed in recent years involving, for example, dual degrees in undergraduate courses, which has also attracted undergraduates. UFPE has a system of student reception through the Institutional Mobility Program (PMI) and programs and projects with foreign partners (e.g., Brafitec, Erasmus, etc.), and at the post-graduate level, UFPE is part of the Alliances Program and the Education and Training of the Coimbra Group of Brazilian Universities (CGBU) and the Organization of American States (OAS) (Brazil Scholarships Program PAEC OEA-CGBU), as well as the CAP-PEC from Capes that helps as a catalysts for the recruitment of foreign students. UFPE regularly offers scholarships for foreign graduate students in partnership with some organizations. This year, 2018, UFPE, using its own resources, will offer 49 masters and doctorate scholarships for students from Latin America and Africa via CGBU.

Strategy to attract faculty and researchers with international experience

As highlighted in the strategies to expand international collaborations, UFPE publishes and carries out widely disseminated Calls for Visiting Scholars, giving priority in the selection process to qualified international human resources. In recent years, more than half of the lecturers contracted as visitors came from countries in Europe and the United States. Since 2014 the University has hired 23 foreign teachers (from the USA, UK, France, Holland, Germany, Israel, Mexico, Portugal, Spain, Colombia, Switzerland, Denmark, South Africa), an approximate investment of R $ 6,000,000.00 (six million reais) toward this end in the last 4 years. This action was totally re-adapted with the aim of attracting foreigners or Brazilians with training abroad in order to incorporate these talents and expand their respective networks. Also noteworthy are the calls for short-term visiting researchers through which the institution was visited by a large number of researchers from different countries. Finally, for our Call for a Permanent Teacher, the written exam, as well as written and didactic tests, could be conducted in English, allowing foreign teachers to participate without mastering the Portuguese language. There are already a number of international scholars being hired by some departments at UFPE.

Strategy to prepare the scholarships for the period abroad as well as for their return, especially in order to increase the knowledge appropriation by the institution.

UFPE has already structured the Núcleo de Línguas - NUCLI, a language center linked to the International Relations Board, which offers classes in English, Spanish, French, Italian, and also Portuguese to foreigners with various types of support (MEC, French and Italian embassies). The modules are offered to the entire academic community (students, teachers, researchers, and administrative technicians), and the process of enrollment, leveling, and placement in classes is done through the MEC portal. To ensure the institution is able to absorb the knowledge obtained abroad, lectures and courses on the subject matter will be included in the process of analysis and selection for the implementation of the various types of grants. UFPE has developed, together with the Post-Graduate Department at PROPESQ, a monitoring and evaluation of the post-doctorates of its effective staff, with the aim of producing a diagnosis that allows drawing policies for the appropriation of knowledge and acquired experience. At the moment, this action is not institutionalized at the level of the central administration. Each PGP and their respective department is in charge at the local levels of control and actions of appropriation of the experiences. A resolution that regulates the institution's post-doctoral program is in the process of being elaborated (final phase, expected to be approved this year). In this document, it is necessary to present a report that should contain the products developed as well as the benefits generated for the institution by the action.

Describe innovative strategies that will be used by the institution that were not mentioned above.

In order to increase the institution's international visibility and draw foreign students and professors, UFPE has been supporting the publication of articles in international journals of high impact through Public Notices for Publications Seeking Funding (for journals Qualis A1 and A2 of international circulation) and (for articles to be submitted / published in journals classified as Qualis B1 or higher). It is also worth mentioning the structure / organization of the PrInt construction, which was carried out through an Internal Edict, selecting the participating Post-Graduate Programs through relevant aspects such as the training of researchers at UFPE and abroad (H-index of Scopus), the PGP rating, and the history and impact (FWCI) of joint publications between UFPE and the foreign institution. There was also strong concern about one of the main points that signal the success of the mobility actions, the need to allocate a significant part of the resources requested for exchange scholarships. These strategic procedures in the preparation of the proposal appear as a guarantee of the success of UFPE's PrInt proposal. UFPE has been working hard to increase the number of international teachers among its faculty or who are here temporarily. Using funding from national research grants to bolster internationalization is a strategy that has been successfully implemented. Many of these initiatives make it possible to allocate resources for both national and international dimensions, such as scholarships for foreign students and financing of international researchers for academic actions at UFPE.

POLICIES

Selection of foreign partners policy, considering that 70% (at least) of the resources should be earmarked for partnerships with institutions based on countries that Capes maintains effective cooperation (listed in Annex I of the call).

UFPE has a tradition of disseminating its research and postgraduate resources through competitive public calls. In this sense, the institution chose to make an internal selection (via edict) of the proposals for the internationalization of the Post-Graduate Programs. Objectively observing four selection parameters: a) the quantity of publications in indexed international journals; b) the collaboration trajectory of the Graduate Programs with research groups in other countries; c) the impact of these collaborations in terms of publication in partnership and its international repercussion (Scopus and Web of Science citations); d) the degree of reciprocity of the collaborations. The selection based on these criteria showed a comfortable result regarding the provisions of Annex I of the Capes PrInt edict, most of our longest-lasting collaborations and best publication results have come from the set of countries set out in the aforementioned Annex.

Internal selection process of specific actions and grants policy, within the funding lines of the Capes-PrInt program. In case of cooperation projects with foreign institutions, the proposer should send an application of funds, the plan of activities, reciprocal funding, academic mobility, technical - scientific production, counterparts of the partner institutions, among others.

As previously stated, UFPE has a tradition of distributing its research and graduate resources through competitive public calls. In this area, it chose to make an internal selection (via edict) of the proposals for the internationalization of its Graduate Programs. Objectively observing four selection parameters: a) the quantitative publications in indexed international journals; b) the collaboration trajectory of the Graduate Programs with research groups in other countries; c) the impact of these collaborations in terms of co-authored publications and international repercussions (Scopus and Web of Science citations); d) the degree of reciprocity of the collaborations. All the proposals of the selected Graduate Programs presented a general plan of intentions with a view to increasing the level of internationalization in progress. The application of the resources and their respective activities are set forth in this plan, foreseeing academic mobility, counterparts of the partner institutions, among others. However, it should be noted that the implementation of the actions described in PrInt-UFPE and the use of the "balcão" or committee will be the object of specific public calls, published on the University / PROPESQ page, aiming for greater transparency of criteria and opportunities. These edicts, according to the UFPE tradition, will be competitive and will strictly comply with the rules set forth in the PrInt Notice item 3.4.1.9 (Selection of beneficiaries) aiming at a better use of the resources approved by CAPES.

Policy for hiring faculty with recognized scientific performance in international level.

UFPE has been working hard to increase the number of international teachers on its faculty. Since 2014, the University has hired 23 international teachers (from the USA, UK, France, Holland, Germany, Israel, Mexico, Portugal, Spain, Colombia, Switzerland, Denmark, South Africa) and an approximate amount of R $ 6,000,000.00 (six million reais) of investment for this action in the last 4 years. This action was totally re-adapted with the aim of attracting foreigners or Brazilians with training abroad in order to appropriate these talents and expand our respective networks. In addition, UFPE launched a public call for a short-term visiting researcher in 2015, which resulted in the institution being visited by 38 researchers from different countries (the Netherlands, Canada, Estonia, USA, UK, France, Italy, Germany, Portugal, Spain, Chile, South Korea, Australia, and Cuba). Combining the two actions, UFPE received 61 researchers from more than 20 nationalities in 4 years with its own resources. Finally, in our Call for a Permanent Teacher, the written exam and didactic tests can be conducted in English, allowing foreign teachers to participate in the entrance exams without Portuguese mastery. In this sense, there are already international scholars being hired by some departments at UFPE.

Policy to increase proficiency in foreign languages for students, postgraduate facultys and technical staff that has direct relationship with the proposed Internationalization Project.

UFPE has today structured the NUCLI - Language Center which offers classes in English, Spanish, French, Italian, and Portuguese to foreigners with the support of the MEC, the French and Italian Embassies, and UFPE itself. The modules are offered to the entire academic community (students, teachers, researchers, and administrative technicians) and the process of enrollment, leveling, and placement in classes is done through the MEC portal. The structure of the NUCLI is linked to the Directorate of International Relations (DIR) at UFPE.

Policy of recognition of academic and scientific activities performed by facultys and students abroad.

Considering the relevance of the relations between UFPE and its foreign peer institutions, as far as the sensu strictu post-graduate program and research are concerned, institutional norms foresee the possibility of accomplishing academic activities abroad, as well as gaining the necessary accreditation to recognize and document the academic completion of such activities. In light of these forecasts, activities are carried out through an international cooperation agreement between the institutions involved, or through the participation of students in exchange programs funded by national or foreign development agencies. Thus, activities carried out in collaboration, through various international cooperation agreements, through doctoral exchange scholarships, or through scholarships funded by national and foreign development agencies, with regularly enrolled students are computed according to the academic profile of the students.

Host and support policy of foreign facultys, researchers and students

Students who come to UFPE through the Institutional Mobility Program (IMP) and programs and projects with foreign partners (eg Brafitec, Erasmus, etc.) are welcomed and received by the International Relations Directorate's (IRD). Post-Graduate students are referred to PROPESQ, which instructs them about postgraduate procedures. The IRD has structured a Sponsorship Program, in which UFPE students receive foreign students and accompany them in their adaptation period at the university and in the city. Before arrival at UFPE, international students receive all the necessary information preparing them for their arrival in Brazil and enrollment in the institution. On UFPE's website, the IRD has made available the manual for foreign students in two languages; it contains information about the city, transportation system, accommodation, estimated maintenance costs, documents necessary for foreign registrations in the country, among others. In the first and second semesters of each year, IRD also promotes both the welcome week and the departure reception for foreign students. With a cultural and academic program of activities, the purpose of the welcome week is to allow the students to introduce themselves, present them with the institution's work and key contacts at the institution, and show them some of the local history and customs. The departure reception, in turn, is a meeting where one can share their experiences during the academic year at UFPE, in the city of Recife, and in Brazil in general. The IRD also maintains contact with foreign students, accompanying their trajectory during its period of study at UFPE. Foreign teachers and researchers also go to the IRD for registration and receive guidance from teachers/researchers who maintain collaborative projects.

Policy for the appropriation of the knowledge and experience acquired abroad by the beneficiaries of the actions of the Institutional Project of Internationalization.

As mechanisms to guarantee the appropriation by the institution of the knowledge obtained abroad, it is foreseen to consider in the process of analysis and selection for the implementation of the various types of mobility grants, the offer of lectures and courses on the subject matter pertinent to said grants. UFPE has developed, together with the Post-Graduate Directorate at PROPESQ, a monitoring and evaluation procedure for post-docs on their effective staff, with a view to producing a diagnosis that allows drawing policies for the appropriation of knowledge and acquired experience. At the moment, this action is not institutionalized at the level of the central administration; their respective departments and programs have control and responsibility over actions of appropriation of the experiences. A resolution that regulates the post-doctoral programs at the institution is in the process of being elaborated (final phase, expected to receive approval this year). For this document, it is necessary to present a report that should contain the products developed as well as the benefits generated for the institution by the action.

Management and operationalization policy of the Institutional Project of Internationalization.

The Institutional Internationalization Project will be managed by the Management Council, and its operationalization will be carried out by the coordinators of the international cooperation projects and the technical staff of the Pro-Rectory for Research and Post-Graduate Affairs/Propesq (registration of goals achieved in each action in the moment of its conclusion). The Management Council's evaluation of the annual reports will allow adjustment actions aimed at improving the operation and execution of PrInt-UFPE. The management group defined a management and monitoring model for the goals and indicators of the projects, based on the guidelines of PrInt and the internationalization project at UFPE. The following aspects will be considered: the model will assess the contribution of the projects and programs involved in UFPE's international visibility. This vision has as its objective to support the re-planning of programs in light of the internationalization actions; the model should be applied annually to support the management and operation of resources, adapting to the changes recommended by CAPES. The application of the model is important for the annual evaluation of the allocation of resources of PrInt to the Programs. The management model can also be used to support new projects aligned to the themes and proposals planned for PrInt, as an incentive for the internationalization actions at UFPE. A small portion of PrInt resources will be allocated to support new projects not contemplated in the initial proposal but well-aligned with the research themes. Emphasis will be placed on those indicators and targets that enable verification of visibility/impact enhancement, such as citations and FWCI values of publications.

Monitoring and internal evaluation of the goals policy of the Institutional Project of Internationalization.

The internal monitoring and evaluation of the PrInt implementation goals will be carried out by the Steering Committee, with the support of Propesq. This monitoring will be carried out every six months and will serve as the basis for the application of the PrInt management model, presented in the previous item. The project implementation goals will be evaluated in terms of accountability by the coordinator, considering: (1) the use of resources in financial terms; and (2) compliance with project indicators and targets. The biannual accountability procedure should inform what was executed, a percentage of the planned goals, and, when necessary, a re-planning of the actions, with concrete perspectives and prediction of the fulfillment of the indicators. The coordinators of the international cooperation projects should also produce an annual report with the partial results of the project, highlighting the goals achieved. To ensure the success of the PrInt project at UFPE, the management model will annually evaluate the results and goals of the projects, taking into account the information provided by the coordinators in the process of continuous monitoring. Thus, the model should encourage the fulfillment of established goals by the established deadlines, as well as the correct and timely availability of the information to be requested of the coordinators, throughout the project.

Policy for the conciliation of national development programs supported by Capes to the internationalization effort.

UFPE has several national development programs that are part of the internationalization effort. One of the main ones supported by Capes is PROAP. This has been used as a policy of induction, mainly in mobilizing our researchers to present papers and participate in conferences and events of international importance; it has also contributed to the financing of foreign researchers conducting studies or post-graduate work at UFPE. Other agencies also make a significant contribution to the internationalization effort. CNPq and FACEPE, for example, finance eight National Institutes of Science and Technology under the leadership of UFPE, which brings together all the institutes of this nature in the State of Pernambuco. They are: Software Engineering, Photonics, Flora and Fungal Herbarium, Information and Decision Systems, Pharmaceutical Innovation, National Observatory of Water and Carbon Dynamics in the Caatinga Biome, Ethnobiology, Bioprespection and Nature Conservation, and Nanotechnology for Integrated Markers. All these institutes have consolidated internationalization channels and lead research at the national level. Another channel of national development with strong international influence are the contributions made by Petrobrás in the Integrated Laboratory of Petroleum, Gas, and Fuel Technology, whose objective is to develop research and innovation activities in several areas of the petroleum industry production chain, gas, renewable fuels, and the like. And finally, the National Institute of Union Technology and Coating of Materials.

Describe here other innovative policies that will be adopted by the institution that were not addressed before in the above items.

Through its International Relations Directorate, UFPE has been developing a strong policy of increasing its visibility through a large number of missions to foreign institutions and participation in international events and fairs to establish international cooperation agreements. Today, UFPE maintains more than one hundred active international cooperations with a high number of dual degree and co-tutelage agreements that broaden and certify the quality of its training process. The broadening of visibility has been supported by effective policies to support publication in high-impact English-language journals, or to the participation of teachers and researchers in international events. It should also be noted that UFPE, recognizing the importance of increasing its visibility, nationally and internationally, and in particular the importance of the new information technologies, created in 2014 the Pro-Rectory of Communication, Information, and Information Technology (Procit). Procit is responsible for coordinating and monitoring the implementation of institutional policy for the management of communication, information, and information technology, as well as related processes, and should expand its role as an agent facilitator of the internationalization process

FURTHER INFORMATION

Number of postgraduate courses taught in English between 2013 and 2016. Quantity of courses	46
Number of cotutela postgraduate programs between 2013 and 2016. Quantity of programs	22
Number of double degree postgraduate programs between 2013 and 2016. Quantity of programs	22
Number of bilateral postgraduate programs between 2013 and 2016. Quantity of programs	0
Number of Capes development programs for which the institution has benefited between 2013 and 2016. Quantity of programs	42
Number of derived products contributions for database of international research projects. Quantity derived products	15
Number of CAPES international cooperation projects from which the institution benefited between 2013 and 2016	82

Insertion of materials, themes and subjects in foreign language in the postgraduate program curricular structure.

The curricula of several post-graduate courses are being updated in order to internationalize said curricula. From 2013 to 2016, UFPE had 46 disciplines taught in a foreign language, and the plan is that in 2022 the number of courses taught in foreign languages be at least four times higher.

EXPECTED BENEFITS

THEME

Biodiversity and Conservation of Natural Resources

International Cooperation Projects

Name of the project	Start date	End date
Phylocytogenetic studies in the Caesalpinia group (Leguminosae)	01/08/2018	31/07/2022

Description

This project aims to investigate the mechanisms responsible for the correlation between genomic changes (including DNA content, abundance of the main families of repetitive DNA, heterochromatin distribution) and environmental/biogeographical variation in the Caesalpinia group (Leguminosae). NGS sequencing (Illumina MiSeq) shall be performed on a 0.1× coverage of the Caesalpinia genome, covering the main clades of the group. The original data of the Illumina sequencing will be analyzed using the RepeatExplorer program (www.repeatexplorer.org), in order to identify repetitive sequences for the comparative analysis amongst different species. The divergence patterns of repetitive sequences and relationships between species shall be determined using a phylogenomic approach based on the comparative abundance of repeats (Dodsworth et al., 2015). Finally, these data shall be correlated with ecological characters using comparative phylogenetic methods. m

Resources to maintenance the projects

Year	Amount (R$)
2019	2.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Young talent – A (6 months)	1	59.155,29
2022	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Man-made disturbances, climatic changes and key organisms on the dynamics of the regeneration of the Caatinga	01/08/2018	31/07/2022

Description

This project aims to understand how chronic man-made disturbances, including climate change and subsistence agriculture affect certain biological groups (e.g.: plants, leaf-cutting ants, and biological soil crusts) and the dynamics of the regeneration of the Caatinga. To understand the relationship amongst agriculture, biological groups, and ecosystem, particularly the acquisition, storage, and circulation of nutrients in the forest regeneration process, it will be necessary to: (1) estimate ecosystem productivity and quantify the biomass above-ground, (2) estimate the acquisition, flow, and spatiotemporal distribution of nutrients in different compartments of the ecosystem (mainly carbon and nitrogen), and (3) estimate the foraging activity of ants and the physiological activity of crusts, as well as quantify their abundances in time and space, considering the chronosequence of regeneration. An eco-physiological profile shall also be outlined (i.e.: estimating the cost of foliar construction; morphoanatomical characteristics of the root, stem, and leaf; and the capacity and benefits of the of arbuscular mycorrhizal plant-fungi symbioses) of the woody plants that are most abundant in the most and least disturbed areas of the Caatinga, as well as in the driest and most humid areas of the Catimbau National Park, PE.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2020	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
The role of ecological restoration on the sustainability of the Caatinga	01/08/2018	31/07/2022

Description

This project aims to understand ecological restoration as the structural axis of the actions aimed at conducting research and promoting public policies, in order to answer the following questions. 1) How do biological communities organize themselves into biological systems affected by human actions? And 2) what is the role of ecological restoration in promoting the water, food, and energy sustainability of the Caatinga? This proposal is divided into two modules. The first one focuses on understanding the promotion bottlenecks and the opportunities for applying ecological restoration inthe scale of the Caatinga biome. Maps of opportunities for restoration will be generated with a focus on promoting sustainability. These maps shall be generated by cross-referencing the biological, physical, social, and economic data of the entire Caatinga biome. The second step intends to understand what ecological factors determine the success of practical restoration actions. Toward this end,, experiments shall be carried out in the field to answer several questions related to the development of communities of trees in the Caatinga. Specifically, we will focus on the functional ecology and the relationship between biodiversity and ecosystem services in the Caatinga.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (6 months)	1	40.478,40
2020	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40
2020	Senior visiting professor abroad (3 months)	1	39.866,40

Name of the project	Start date	End date
Investigate current and future patterns of gene flow and gene structure of 16 endemic bird species of the Caatinga, both arboreal and shrubby.	01/08/2018	31/07/2022

Description

Lecturers in charge: Luciano Naka (PGPAB-UFPE); Dr. Scott V. Edwards (Harvard University, Dr. Gustavo Sebastián Cabanne (Argentinean Museum of Natural Sciences, Bernardino Rivadavia), Dr. Gustavo Bravo (Harvard University) Justification for Project 7: Caatinga endemic bird species are not distributed uniformly in this biome (Fig. 1). Half of the approximately 50 taxa of endemic birds of the Caatinga occur mainly in open areas of shrubby Caatinga, abundant in man-made areas, farms, and peri-urban areas of lowlands in the depression of the bushland known as the sertão (areas below 600 m). The other half of these taxa occurs exclusively in the Caatinga's arboreal forest areas, in higher regions such as plateaus (usually above 600 m). Due to the continuous distribution of the lower regions and the fragmented distribution of the higher areas, it can be expected that the species in the shrubby Caatinga will possess higher gene flow rates among their population than the species in the dense/arboreal Caatinga. Tasks to achieve objective 7 (Brief methodology): specifically, here we shall: i) quantify the intra-specific gene flow rates in endemic bird species of the Caatinga and ii) investigate current patterns of genetic structuring and historical demography. The patterns of gene flow and population structure will be studied using genomic data. UCEs (Ultraconserved Elements) and RAD-seqs (Restriction Site Associated DNA) will be used in order to obtain SNPs (Single Nucleotide Polymorphisms), which will be used to infer current and past population patterns. The samples shall be collected in eight locations in the Caatinga in the lowlands (< 600 m) and highlands (> 600 m). DNA samples (specimens or blood samples) of at least five individuals of each target species per locale are to be collected. Sampling shall be complemented with the attainment of DNA from the specimens already deposited in the UFPE Bird Collection through the use of protocols of extraction of elder DNA.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Visiting professor in Brazil (1 month)	1	23.155,29
2022	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Reconstruction of Phylogeny and Karyotype evolution in Melocactus Link & Otto (Cactaceae: subfamily Cactoideae).	01/08/2018	31/07/2022

Description

This project aims to reconstruct the phylogeny of the genus Melocactus via the comparison of plastidial DNA sequences, as well as identify mechanisms of karyotype evolution involved in the diversification of the genus. NGS sequencing shall be used, as well as a plastidial molecular phylogeny and the basic cytogenetic characterization of the species of the genus Melocactus. NGS sequencing (Illumina MiSeq) will be performed on a 0.1× coverage of the Melocactus. The original data of the Illumina sequencing shall be analyzed in the RepeatExplorer program (www.repeatexplorer.org) to identify repetitive sequences for the molecular cytogenetic characterization and comparative analysis among different species.

Resources to maintenance the projects

Year	Amount (R$)
2019	2.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Verify the effect of chronic man-made disturbances, climatic changes, and regeneration of vegetation in the Caatinga on communities of ants and butterflies.	01/08/2018	31/07/2022

Description

Lecturers in charge: Inara Leal (PGPAB), Alan Andersen (Tropical Ecosystems Research Centre, Darwin, Australia), Rainer Wirth (University of Kaiserslautern, Kaiserlautern, Germany). Justification for Project 10: The results of this study, in addition to the theoretical implications, shall allow the modeling of biological scenarios including future environmental degradation in response to the intensification of human activities, both at the landscape scale and at the regional level. Tasks to achieve objective 9 (Brief methodology): a set of 30 fall traps for ants and 8 traps for frugivorous butterflies shall be used on plots established along the following gradient: (1) chronic disturbance (e.g.: different levels of man-made pressure caused by the use of timber and non-timber forest products and by domestic animals), (2) precipitation (i.e.: from 500 to 1000 mm/year simulating climate change expectations for the Caatinga region) and (3) regeneration ages (i.e.: chronosequence from 7 to 70 years after slash-and-burn agricultural use). From a scientific perspective, we will verify if man-made disturbances and climatic changes interact in synergy, homogenizing communities of ants and butterflies. It is also expected that the process of regeneration of the Caatinga vegetation will allow the reorganization of ant and butterfly communities at similar levels of abundance, taxonomic composition, and functional groups comparable to those observed in mature communities.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (6 months)	1	40.478,40
2021	Visiting professor in Brazil (1 month)	1	23.155,29
2018	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
International Interdisciplinary Compounded Laboratory 'Physics, Biochemistry, Ecology, and Human Dynamics of the Tropical Atlantic' – IJL TAPIOCA – UFPE	01/08/2018	31/07/2022

Description

The International Mixed Laboratory 'Interdisciplinary Tropical Atlantic Laboratory on Physical, Biochemical, Ecological, and Human Dynamics' (IJL TAPIOCA) was recently approved and funded by the Institute for Research Development (IRD) in France. The IJL-TAPIOCA aims at a structuring role for the medium-term establishment of a Regional Center for Excellence in Marine Sciences for the tropical Atlantic in Recife, fulfilling at the same time the following objectives: (i) improve internationalization; and (ii) fill scientific, technological and methodological gaps by supporting the development of innovative research in areas not yet explored in Brazil. The TAPIOCA Platform is organized along two axes hosted in existent facilities in Recife. The first axis, 'Observing the structure and dynamics of the ocean to scale,' shall provide knowledge about the structure of the ocean. The second axis, 'Space occupation by marine organisms and fishermen using natural and artificial markers' shall document how organisms and fishermen move within this ocean space. TAPIOCA's scientific advances shall inform related projects and provide elements in order to respond to key climatic, environmental, and social issues. In addition, student training is one of the pillars of IJL TAPIOCA, with a clear commitment to stimulating research education in the marine sciences in Brazil in collaboration with other countries. For this purpose, TAPIOCA shall focus on four transversal aspects: (i) encourage co-orientation and co-graduation of students; (ii) provide training in the disciplines to be developed in axes 1 and 2; (iii) organize multidisciplinary international summer schools about Tropical Marine Science; and (iv) disseminate the experience through new educational tools (e.g.: MOOC) supported by Brazilian universities. The medium-long term objective of TAPIOCA is the establishment of an Inter-university Center of Excellence in Sciences of the Tropical Sea in Recife.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (12 months)	1	76.276,80
2022	Ph.D. sandwich (12 months)	1	76.276,80
2020	Ph.D. sandwich (12 months)	1	76.276,80
2019	Training (1 month)	1	15.458,40
2020	Training (1 month)	1	15.458,40
2021	Ph.D. sandwich (6 months)	2	80.956,80
2021	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2020	Training (1 month)	1	15.458,40
2020	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2021	Training (1 month)	1	15.458,40
2022	Training (1month)	1	15.458,40
2020	Senior visiting professor abroad (6 months)	1	65.678,40

Name of the project	Start date	End date
Assess the diversity, evolution, and bio-invasion caused by bryozoans and poriferans, through an integrated study using molecular and morphological techniques	01/08/2018	31/07/2022

Description

Lecturers in charge: Ulisses Pinheiro (PGPAB-UFPE); Leandro Vieira (PGPAB-UFPE); Andrea Waeschenbach and Dr. Ana Riesgo (Natural History Museum, London, UK), Dr. Andrew Ostrovsky; Dr. Thomas Schwaha (University of Vienna, Austria), Dr. Piotr Kuklinski (Institute of Oceanology Polish Academy of Science, Poland). Justification for Project 2: knowledge of biodiversity and its loss is among the goals established in the Convention on Biological Diversity (COP-10)—Brazil is one of the signatory countries. Considering the absence of studies on the diversity of bryozoans and sponges in Brazil involving different techniques (morphology, anatomy, genetics, and mineralogy), this project will be a pioneering effort in the country and will allow the training of researchers in innovative areas in the evaluation and conservation of biodiversity. Tasks to achieve objective 2 (Brief methodology): specimens shall be obtained in Brazil, through collection or collaborations already established with different researchers. Specimens deposited in the Porifera and Bryozoan collections of NHMUK (London), including type material, shall be analyzed. Some specimens shall be prepared for study using different morphological techniques, using Scanning Electron Microscopy (SEM) [NHMUK and University of Vienna], Confocal Electronic Microscopy [University of Vienna], and different techniques of immunocytochemical [University of Vienna] of mineral composition [Polish Academy of Science]. Protocols for sample preparation, DNA extraction, PCR, and cloning, for a molecular phylogenetic approach, shall be performed at UFPE (multi-locus analysis) and NHMUK (genomic analysis).

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2019	1	23.782,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40
2021	Visiting professor in Brazil (1 month)	1	23.155,29

Name of the project	Start date	End date
Karyotype and phylogeny evolution of the Ameroglossum Eb. Fisch., S. Vogel & A. V. Lopes and related genus based on chromosome analysis and Restriction-Associated DNA sequencing (RADseq).	01/08/2018	31/07/2022

Description

This project aims to analyze the phylogenetic relationships and mechanisms of karyotype evolution between the Ameroglossum species and related genera using the RADseq technique and chromosomal analysis in order to understand intra and intergeneric relations in this group of plants with an evolutionary history associated to the occupation of continental environments similar to oceanic islands. The evolutionary relations to Ameroglossum and related genus shall be evaluated through a classical molecular cytogenetic approach, in addition to the coloration with fluorochromes and the last generation RADseq. From the total nuclear DNA extracted from leaves according to the CTAB method with slight modifications (Tel-Zur et al., 1999), RAD markings libraries shall be prepared for high performance Illumina sequencing according to Baird et al (2008). The libraries are sequenced in the Illumina Genome Analyzer according to the manufacturer's instructions. In order to study the phylogenetic relationships amongst the Ameroglossum species, the sequence data set shall be analyzed by Maximum Parsimony, Maximum Probability, and Bayesian Inference by means of different software.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	1	29.110,00

Resources to maintenance the projects

Year	Amount (R$)
2019	2.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Investigate the coral diversity of the first open marine protection area of Argentina (Namuncurá Marine Protected Area - N MPA) involving richness, distribution, and bioprospecting of active molecules.	01/08/2018	31/07/2022

Description

Lecturers in charge: Carlos Perez (PGPAB – UFPE), Paula Braga (PGPAB-UFPE), Laura Schejter (INIDEP, Argentina). Justification for Project 11: The Namuncurá Marine Protection area was recently created on the basis of pilot studies which present the high biodiversity potential of the region. For such, sampling efforts were made with oceanographic campaigns conducted in 2016 and 2017, and two other expeditions planned for 2018 and 2019, with the aim of better understanding the biodiversity of the area and in order to assess whether its size needs to be re-evaluated. One of the most abundant groups in the region is the anthozoan cnidarians. The aim is to understand the biodiversity of the group and compare it with the diversity of Brazilian anthozoans, as well as test its applicability as a source for natural products. Tasks to achieve objective 11 (Brief methodology): Taxonomic analyses of coral collected in the area shalle be performed through integrative methods of taxonomy: geometric morphology, biogeography, and use of new molecular markers for the group. In addition, biochemical analyses and tests with extracted specimens shall also be performed.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (6 months)	1	40.478,40
2019	Visiting professor in Brazil	1	23.155,29

Name of the project	Start date	End date
Development and application of chemical, molecular, biochemical, and morphological biomarkers for the diagnosis and monitoring of the effects of chemical pollution on fish, with emphasis on the effects of petroleum	01/08/2018	31/07/2022

Description

Lecturers in charge: Paulo Carvalho (PGPAB-UFPE); Dr. Donald E. Tillitt (Senior scientist at CERC-USGS Columbia Environmental Research Center – United States Geological Survey). Fish stand out either as laboratorial test-organisms or as a sentinel species in the field, and there is a growing need for the development and application of methodologies based on the assessment of sublethal toxicity in the diagnosis and monitoring of chemical pollution in aquatic ecosystems, as well as the improvement of national legislation related to water quality. Tasks to achieve objective 5 (Brief methodology): The collaboration shall involve the participation of doctoral students in projects, applying methodologies for the analysis of petroleum aromatic hydrocarbons in fish bile, molecular, morphological, and histopathological biomarkers in fish, including the zebrafish from São Paulo.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	1	23.782,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40
2020	Visiting professor in Brazil (1 month)	1	23.155,29
2020	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Systematics and Evolution of Cryptanthus Otto & A. Dietr. (Bromelioideae, Bromeliaceae).	01/08/2018	31/07/2022

Description

This project aims to investigate the levels of genetic diversity and populational structure of morphologically similar species of Cryptanthus occurring in the Atlantic Forest north of the São Francisco River, in order to understand the group diversification processes (e.g.: incomplete strains or hybridization), reassess the conservation status of the species, and propose conservational strategies. Twenty to thirty (20–30) specimens of the Cryptanthus and Orthophytum species distributed north of the São Francisco River shall be collected for DNA extraction and molecular analyses. Testing with the plastidial and nuclear primers used in different studies with Bromeliaceae is being carried out for the identification of polymorphic informative regions (e.g.: Givnish et al., 2011 [atpB-rbcL, matK, ndhF, psbA-trnH]; Louzada et al., 2014 [PHYC, trnL-trnF, trnH-psbA]). After being amplified, the polymorphic regions shall be sequenced in partnership with the Vale Technological Institute, and the molecular data generated shall be used for phylogenetic reconstructions.

Resources to maintenance the projects

Year	Amount (R$)
2019	2.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2019	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Assessment of global changes in climate and other man-made impacts on the behavior, communication, and distribution of primates and manatees.	01/08/2018	31/07/2022

Description

Lecturers in charge: Bruna Bezerra (PGPAB – UFPE); João Pedro Souza Alves (PGPAB-UFPE); Gareth Jones (University of Bristol – U.K.); Orly Razgour (University of Southampton – U.K.). Justification for Project 3: Understanding the possible alteration in the behavioral and distribution patterns of an animal due to global changes in climate is a key factor to ensuring the viability of a species in different future scenarios. Different aspects of mammalian biology may be affected by changes in climate, resulting in social and behavioral responses, placing the species at risk of extinction. Thus, in order to understand the possible responses of a species to future climatic changes, and other man-made disturbances, it is important to understand the behavioral, social, and spatial compensations that occur with natural variations of the environment. Tasks to achieve objective 3 (Brief methodology): Acoustic and computational modeling tools shall be used in order to understand how primates and manatees respond to climatic changes and other human pressures. Vocalization and animal behaviors shall be recorded under different climatic scenarios. The influence of temperature, rainfall, humidity and/or salinity shall be assessed on both animal behavior and vocalizations. Models of structural equations shall be used to evaluate potential behavioral changes according to different scenarios of future climatic changes. In situ and ex situ playback experiments shall be conducted to understand how the communication of primates and manatees is affected by diverse man-made disturbances. Considering different algorithms, species distribution models shall be used to predict current and future distributions, as well as identify cost-effective priority areas for conservation.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	1	23.782,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2020	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Evaluation of entomological radioresistance for the monitoring of biodiversity and genetic adaptations in the semi-arid region known as Caatinga in the Northeast of Brazil.	01/08/2018	31/07/2022

Description

Lecturers in charge: Claudia Rohde (PGPAB-UFPE); Dr. Ricardo Marcos (Grup de Mutagènesi, Departament de Genètica i de Microbiologia, Edifici C, Universitat Autònoma de Barcelona, Cerdanyola del Vallès, Spain). Justification for Project 4: Radio-resistance is the level of ionizing radiation that organisms can withstand. Multiple factors contribute to the high radio-resistance of insects, such as changes in the regulation of apoptosis; mechanisms capable of decreasing intracellular reactive oxygen species (ROS); greater efficiency in DNA repair, among others. However, the higher efficiency in DNA repair seems to be the main factor that determines the high radio-resistance of insects and also of mammalian cells. The Earth is a source of natural terrestrial radiation, as it contains radioactive materials, such as Uranium, Thorium, and Radium, present in soil and rocks. Rates of terrestrial sources vary in different parts of the world, but places with higher concentrations of uranium and thorium in the soil usually have higher rates. This is the case of the semi-arid Caatinga region of Brazil, one of the main geological reservoirs of Uranium in the world. This Brazilian semi-arid region covers an area of 1 million km2, or 12% of the national territory, where more than 22 million inhabitants face an adverse environmental scenario due to water scarcity. Tasks to achieve objective 4 (Brief methodology): Several methodologies in the area of genetics and mutagenesis shall be used in order to evaluate the effects of the natural radiation present in the semi-arid region of the Northeast of Brazil on drosophila insects, monitoring their local biodiversity and associated genetic adaptations. Drosophila melanogaster and other local and exotic species (Diptera, Drosophilidae) shall be collected in radioactive and nonradioactive environments of the semi-arid Caatinga biome. To evaluate sensitivity, radio resistance and local adaptation, the Somatic Mutation, and Recombination Test, the Comet Test, and the Micronucleus Test shall be performed. These techniques are ideal for the study of local adaptations of Drosophilidae in the semi-arid region of Northeastern Brazil. These analyses shall be complemented by the quantification of Radon and other radionuclides. Genetic analysis of the strains of the native and exposed drosophilidae shall be carried out as regards intracellular oxidative stress analysis; measurement and depletion of glutathione; and immunoassay, in collaboration with national and international research groups.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2022	Ph.D. sandwich (6 months)	1	40.478,40
2021	Visiting professor in Brazil (1 month)	1	23.155,29

Name of the project	Start date	End date
Recuperation of the services provided by ants to plants throughout the regeneration of the Caatinga vegetation.	01/08/2018	31/07/2022

Description

This project aims to verify if the seed-scattering services and anti-herbivory defenses provided by ants to plants are recuperated with the regeneration of the caatinga vegetation. For seed-scattering services, removal tests are performed with selected plant species along the chronosequence. Species of ants removing the seeds, their rates, and distances of removal shall be identified, as well as seed deposition locations. Attacks of ants on herbivores shall be simulated in the same chronosequence also using species of selected plants, for anti-herbivory defenses.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2020	Senior visiting professor abroad (3 months)	1	39.866,40

Name of the project	Start date	End date
Polyphasic approach to the study of fungal diversity in Brazil	01/08/2018	31/07/2022

Description

With the advent of molecular approaches to species delimitation, recent estimates suggest that there are between 2.2 and 3.8 million species of fungi. However, according to the 11th edition of the Dictionary of Fungi, only about 120,000 species have been described, mainly based on morphological observations of fungi. The polyphase approach is characterized by the combination of different tools for identification of fungi, such as morphological, physiological, biochemical, molecular, and proteomic characteristics. The Brazilian territory hosts the largest biological diversity in the world. Estimates of fungal diversity in Brazil are still based on one or a few characteristics, such as morphology and/or physiology. Therefore, the mapping of taxa should be improved in order to better understand the real fungal diversity in the country. The Post-graduate Program in Fungal Biology (PGP-FB) offered by the Department of Mycology at UFPE stands out as the only one in Brazil focusing on the study of fungal diversity. The research projects developed in the program and its intellectual production cover the description of this diversity in the majority of Brazilian biomes. The PGP-FB/UFPE has several agreements/ partnerships with foreign institutions. Among these institutions, partnerships were established with the Natural History Museum/University of Oslo (Norway), Friedrich-Schiller-Universität Jena, and Leibniz-Institut für Naturstoff - Forschung und Infektionsbiologie (Germany), Agroscope Reckenholz-Tänikon Research Station (Switzerland), Università di Torino and Istituto di Protezione delle Piante CNR (Italy), University of Tartu (Estonia), University of Copenhagen (Denmark) and Fundamental Research Institute on Tropical Agriculture of Cuba (Cuba), Westerdijk Fungal Biodiversity Institute (Netherlands), University of Minho - Portugal (Specific Agreement, Agreement 91/2013-UFPE), and the University of La Frontera - UFRO - Chile (General Cooperation Agreement 61/2016). With such proposal, the PGP-FB aims to improve knowledge using new taxonomic tools for the identification of fungi (polyphasic approach), promoting the exchange of students/researchers between the Program and the Westerdijk Institute (Netherlands), the University of Minho (Portugal), and the UFRO (Chile), guaranteeing the training of Brazilian biologists in polyphasic taxonomy.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2019	4	79.143,00
2020	1	12.694,00

Resources to maintenance the projects

Year	Amount (R$)
2020	10.000,00
2019	10.000,00
2021	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	2	80.956,80
2020	Ph.D. sandwich (6 months)	2	80.956,80
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Visiting professor in Brazil (15 days)	3	48.465,87

Name of the project	Start date	End date
Hazardous waste biodegradation and technology for treatment of contaminated water and soil (RECAL)	01/08/2018	31/07/2022

Description

The project is part of the research lines of the researchers group of the Laboratory of Environmental Sanitation (LSA) of UFPE. In 2017, the LSA-UFPE partnered with the University of Arizona in the United States of America (process 015432 / 2017-93). The agreement enables the academic mobility of students and researchers, with exemption from student fees at the University of Arizona. Biodegradation of ammunition (nitroaromatic explosives) in water and soil is one of the main research lines of the group led by professors Jim A. Field and Reyes Sierra-Alvarez at the University of Arizona, continuously funded by the U.S. Army for the conservation of ecosystems and decontamination. The Environmental Sanitation Laboratory (ESL-UFPE) is working in cooperation with the Laboratory of Environmental Microbiology of the Autonomous University of Madrid (UAM) in Spain on molecular biology applied to environmental technology, which includes an agreement of co-tutelage and dual degrees (2 PhD students from UFPE). Since the nineties, there has been an intense exchange with Professor Jose Luis Sanz Martin, on both ends; UPFE and UAM have also hosted each other's post-doctoral students. Currently (December / 2017 to April / 2018) Prof. Jose Luis Sanz Martin holds the position of visiting professor at UFPE. Studying the conservation of natural resources aimed at the sustainability of groundwater for future generations, an ongoing bioremediation project of recalcitrant compounds from a contaminated site in Camaçari in Bahia, Brazil is being carried out through a partnership between UFPE, the University of Toronto (UofT), and the multinational company Dupont. The project enjoys financial support from the Natural Sciences and Engineering Research Council of Canada (NSERC) and Dupont. The culture of KB-1 microorganisms, known worldwide and applied in bioremediation processes, was developed by Prof. Elizabeth Edwards, a partner of this project. It is worth mentioning that Prof. Sávia Gavazza from PGPEC-UFPE spent one year at UofT (from 2016 to 2017) as a visiting professor. This experience resulted in a continuous collaboration through the associate professor contract (status only) along UofT. The fourth partner of this project is Prof. Marc Wichern from the Ruhr University of Bochum (Germany), who conducted teaching and research activities at PGPEC through the PROBRAL program, a result of the partnership between CAPES and the German Academic Exchange Service (DAAD).

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	1	15.790,00
2018	1	13.911,00
2020	1	15.790,00
2019	1	15.423,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2022	Ph.D. sandwich (6 months)	1	40.478,40
2019	Ph.D. sandwich (12 months)	1	76.276,80
2021	Ph.D. sandwich (6 months)	1	40.478,40
2020	Ph.D. sandwich (12 months)	1	76.276,80

Name of the project	Start date	End date
Taxonomic review of Manonychus Moser and Blepharotoma Blanchard for analysis of material type and use of photomicrography.	01/08/2018	31/07/2022

Description

Lecturers in charge: Luciana Iannuzzi (PGPAB – UFPE); Dirk Ahrens - Zoologische Staatssammlung München, Munich, Germany. Justification for Project 9: Manonychus Moser, 1919 brings together six species with exclusive distribution in Brazil. Its classification is confused, having been allocated among the Macrodactylini Burmeister, yet currently considered incertae sedis. Blepharotoma Erichson, 1850 (Sericoidini) gathers 17 species, mostly Brazilian (10 species). In both cases, the descriptions of the species are old, most of them superficial, and their taxonomy has never been revised. This issue has generated great difficulty for taxa identification and understanding of groups. According to Cherman et al. (2016), both genera need to be taxonomically reviewed. The study of the material type is essential for taxa to be reviewed, so that the identification of the specimens and the veracity of the information contained in the original descriptions can be proven. Tasks to achieve objective 9 (Brief methodology): Deposited material type shall be analyzed at the Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (ZMHB). The study shall be based on the external morphology of the body, including the oral cavity and male genitalia (aedeagus). High-resolution photomicrography of the specimens and labels shall be obtained

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	23.155,29
2019	Visiting professor in Brazil (1 month)	1	40.478,40

Name of the project	Start date	End date
Same origins, different results? Effects of diploidization on allotetraploids of the Dilatata group of the genus Paspalum (Poaceae).	01/08/2018	31/07/2022

Description

This project aims to analyze the genomes of the allotetraploids species of the Dilatata group of Paspalum to determine the consequences of the diploidization process in the genomic diversification of species with a common or very close origin. All the allotetraploid materials of the Dilatata group of Paspalum, as well as the possible diploid progenitors shall be maintained in cultivation and analyzed in the present subproject. A draft genome for the species P. juergensii shall be constructed. Subsequently, the analysis of repeated DNA sequences shall be conducted, allowing the comparison of the repeated sequences present in the tetraploid and diploid related species. The RepeatExplorer pipeline (http://www.repeatexplorer.org/) uses clustering analysis based on graphics which shall be used to characterize the repetitive fraction of these genomes. Finally, post-diploidization chromosome rearrangement analysis shall be performed, with repeated sequence mapping and single sequences with oligo-FISH paint probes in tetraploid and diploid related species.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Visiting professor in Brazil (6 months)	1	95.155,29

Name of the project	Start date	End date
Assessment of potential impacts of rise in sea level: structural and functional analysis of marine invertebrate communities of natural and artificial reefs	01/08/2018	31/07/2022

Description

Lecturers in charge: Paulo JP Santos (PGPAB-UFPE); André M Esteves (PGPBA-UFPE); Marleen De Troch (Ghent University – Belgium). Justification for project 1: With the expectation of sea level rise as a result of climate change, there shall be a decrease in the habitats of mid-coastal natural reefs (coral reefs and sandstones) and, at the same time, a greater necessity for coastal protection structures (different types of breakwaters such as piers and dikes) which shall offer new artificial habitats. Such substitution could lead to significant losses of biodiversity or functionality of the coastal ecosystems and should be investigated. Tasks to achieve objective 1 (Brief methodology): Replicated samples shall be collected from benthic communities on both types of substrate already existing along the coast of Pernambuco (minimum 4 areas with two types of reef separated by at least 5 km). Biodiversity measures of main taxa of the meiofauna (Nematoda and Copepoda) shall be incurred in each region, as well as their energy content. This energy content is fundamental for higher trophic levels (in fish for example, which feed on reefs) and proportions shall be estimated by determination of fatty acid profiles. Changes in biodiversity or fatty acid composition shall be estimated statistically, which will allow the assessment of the potential impact of sea level rise on both biodiversity and the trophic web of coastal ecosystems. In addition to the collections, artificial substrates with different textures (concrete, rocks) shall be used in order to verify differences in their colonization potential.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40
2019	Visiting professor in Brazil (1 month)	1	23.155,29
2020	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Systematics and Evolution of Piptolepis Sch. Beep. (Compositae, Vernonieae)	01/08/2018	31/07/2022

Description

This project aims to investigate the evolutionary and systematic history of Piptolepis Sch. Beep. (Compositae), through phylogenetic and phylogeographic studies using new generation DNA sequencing (NGS) techniques, contributing to the understanding of diversification, speciation, evolution and biogeography in the neotropical region. Young leaves of species of the genus Piptolepis and closely related species (Loeuille et al., 2015b) will be collected and preserved in silica gel for phylogenetic and phylogeographic studies. Molecular data will be obtained using new generation DNA sequencing (NGS), in Illumina iScan Sequencing Module platform. The probes of 763 loci specially developed for Asteraceae (Mandel et al. 2014) will be used. Both Parsimony and Bayesian methods of analyses (Huelsenbeck & Ronquist 2001) will be carried out. The phylogeographic analysis of Piptolepis ericoides complexes will be carried out taking samples of different morphotypes found throughout the Espinhaço's range of mountains located in MG. The population-level data gathered with NGS will be used in the phylogeographic analysis.

Resources to maintenance the projects

Year	Amount (R$)
2019	2.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Junior Outdoor Visiting Professor (3 months)	1	36.986,40
2020	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Relation between demographic history of expansion/retraction of selected populations in Squamata and Anura	01/08/2018	31/07/2022

Description

Lecturers in charge: Pedro Nunes (PGPBA – UFPE); Dr. Antoine Fouquet (Laboratoire Evolution & Diversité Biologique, Université Toulouse III Paul Sabatier, France). Justification for Project 6: There is a need to investigate the demographic history of the previously mentioned groups in a region that is historically recognized as divided and isolated due to its climatic oscillations during the Pleistocene period which resulted in repeated events of expansion and retraction of tropical forests. Such expansions and retractions were decisive in creating connections and exchanges of fauna between the Atlantic Forest (located in the northeast region of Brazil) and the Amazon forest. These regions were probably connected by wet corridors in the forests that today have become semi-arid climates. The retraction of these passageways has left a few fauna and flora populations in what remains of the wet forest and a few isolated in higher semi-arid areas (or higher wetlands). Tasks to achieve goal 6 (Brief methodology): Here we are going to identify, characterize and reconstruct the evolutionary history of selected taxa of reptiles such as Squamata and amphibians like Anura with populations that are in enclaves presented in wet forests, inserted in the semi-arid array ("wetlands") that can also incur in the Atlantic forest and Amazon forest. The taxa are selected definitively based on the result of the samples; however, some species related to wet areas with potential to fulfill the criteria may also be initially considered. The tissue samples previously collected in programmed expeditions will be added to the tissue samples previously collected in both Atlantic and Amazon forests and will be deposited in reference collections. (e.g., Tissue Depository Bank of Herpetology Laboratory in IB- USP and the Federal University of Pernambuco). Based on these samples, researchers will extract DNA and perform genomic analysis on the basis of data obtained by the probes in ultraconserved elements (UCE), aiming to establish evolutionary relationships between different populations.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2020	1	23.782,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2021	Visiting professor in Brazil (1 month)	1	23.155,29

Name of the project	Start date	End date
Use of Ecological-Chemical tools to enlighten plant-insect interactions as well as the reproductive isolation of insects.	01/08/2018	31/07/2022

Description

Lecturers in charge: Artur Maia (PPGAB-UFPE); Stefan Dötterl (University of Salzburg, Salzburg - Austria); Luis Nuñez (Universidad de La Salle, Bogotá - Colombia). Justification for project 6: More than 75% of all angiosperm taxa known depend on insects as pollen vectors in order to guarantee reproductive success. Along with visual indications, the floral reproductive systems evolved in order to attract effective pollinators, at the same time that the perfumed flowers and inflorescences became vulnerable to flower-eating insects. These intricate friend-or-foe interactions drastically influence the evolution of plants and insects, a particularly noticeable phenomenon in the neotropical region. Pre-zygote obstacles inhibit mating and fertilization which constitutes a powerful stimulating mechanism in the insect diversification process. The Pheromone-induced radiation may have been a crucial factor in the fast diversification of Nymphalidae butterflies (from the Nymphalidae family) characterized by their small legs, and Cyclocephalini bugs, two of the richest insect species present in neotropical regions. Historically, the VOC implementations in flower scents received little attention in biological control programs. In South America, the fruit production of a significant number of farming industries relies on pollination services from insects that are attracted by floral scents; they may be severely affected by flower-eating and bug-eating species. Brief methodology: i) Investigate the flower scent compounds in angiosperms present in South America, to illuminate the role of these chemical volatile organic compounds in the formation and diversity of plant-insect relations; ii) Understand the mechanisms of reproductive isolation chemically brokered by Nymphalidae butterflies and Cyclocephalini insects; iii) to use semiochemicals extracted from floral scents in pest-management plans in economical exploration cultures in South America. Researchers will provide: floral scent sampling; hydrocarbons present in cuticles and androconial secretions sampling; chemical analysis and biological tests. Selected compounds like floral VOCs and their synthetic extract will be controlled and tested in laboratory and field experiments.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Water and Carbon dynamics in a Caatinga biome (WCDC).	01/08/2018	31/07/2022

Description

Agriculture, livestock farming and forest exploitation are activities vulnerable to climate factors and affected by extreme events. There is evidence that shows that an increase in temperature in the future may cause a decline in production of some of the main agricultural products, and the Northeast will be one of the most affected regions. Therefore, to create data that allows a better understanding of the ecosystem mechanics in the Northeast and the models of the scenarios, it is important to support a delineation of adaptation strategies. In the last few years, the team has developed research on water dynamics, carbon, and nutrients in ecosystems located in regions that represent the main climate conditions in the Caatinga biome. Our research team has demonstrated capacity in organizing and conducting great projects and great scientific productions as well as active participation in training human resources. These researchers have many ongoing projects in which long-term experiments were implemented in many locations of the Caatinga biome. In these locations, where experimental procedures are being conducted, there are climate monitoring towers, hydrological monitoring stations, and energy flows, and it also conducts biogeochemical cycling research. In addition to conducting experimental research, these research teams develop hydrological modeling activities (3D imaging data) of water flows and solutes and also biogeochemical cycling activities. It is expected that this proposal enables the expansion and consolidation of the existing international collaboration between the University of Guelph, the IRD, ENTPE, IGE, and UFPE. In conclusion, it is expected that this proposal will contribute effectively to generating scientific data and training human resources to develop sustainable management policies in ecosystems located in the Brazilian Northeast.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	1	26.446,00
2020	1	26.446,00
2021	1	22.839,00
2019	2	49.284,00

Resources to maintenance the projects

Year	Amount (R$)
2019	10.000,00
2021	10.000,00
2020	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (12 months)	1	76.276,80
2020	Visiting professor in Brazil (1 month)	2	46.310,58
2019	Visiting professor in Brazil (1 month)	1	23.155,29
2020	Ph.D. sandwich (12 months)	2	152.553,60
2022	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Ph.D. sandwich (12 months)	1	76.276,80
2021	Visiting professor in Brazil (1 month)	2	46.310,58

Name of the project	Start date	End date
Soil use, natural regeneration and ecosystem services provided by Caatinga: Connecting Conservation and Sustainability Units.	01/08/2018	31/07/2022

Description

This project aims to understand the relations between soil use, natural regeneration dynamics, and ecosystem services performed by the Caatinga's vegetation in order to (1) characterize the potential services provided by the UCs in different scales, (2) define management guidelines of UCs areas and its surroundings that can maximize the environmental services provided, (3) incorporate UCs into strategies of adaptation and transition to sustainability. This subproject is divided into six operational modules, including two scales of work, local (i.e., inside National Park of Catimbau and its surroundings) and regional (different land portions larger than the local scale). Module 1. Soil use and vegetation deployment in Caatinga (local scale). Module 2. Conservation value for ecosystem services (local scale). Module 3. Regeneration dynamic and its determinants (local scale). Module 4. Environmental capital and services provided by UCs that benefit the Caatinga (regional scale). Module 5. Socioeconomic determinants of native vegetation funding (i.e. environmental capital): a cooperation with sustainable growth (regional scale). Module 6. Training and information exchange.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40
2020	Senior visiting professor abroad (3 months)	1	39.866,40

Name of the project	Start date	End date
Floral scents in new tropical systems specialized in pollination.	01/08/2018	31/07/2022

Description

This project aims to analyze the chemical compounds in flower scents in different pollination specialized systems specifically those involving pollination of bees, moths (sphynx species), and bats (Malpighiaceae family). We intend to answer some questions such as: What is the composition and quantity of scents exhaled by oil producing plants? What is the influence of these signals for selective attraction in pollinator bees? Among flower species that may or may not present oil secreting glands, what are the differences in their bouquets? To chemically characterize the floral volatiles in different species, samples will be collected (N=10 of each Malpighiaceae species) by means of the dynamic headspace analysis (Raguso and Pellmyr, 1998). These inflorescences will be placed into polythene bags, and the air contained in the bags will be removed using a suction pump. Controlled samples from the vegetative and environmental air will be collected to avoid possible pollutants. The samples will be eluted in a hexane solution and stored at a temperature of -24 °C. The compounds will be identified by gas chromatography attached to mass spectrometry (GS-MS). The procedures and equipment will be the same used by Maia et al. (2014).

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Ph.D. sandwich (6 months)	1	40.478,40

Missions not linked to projects R$ 0,00

Scholarships Not Related to Research Projects

Year	Modality	Quantity	Amount (R$)
2022	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2022	Ph.D. sandwich (6 months)	3	121.435,20
2020	Young talent with experience abroad – A (6 months)	1	59.155,29
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Ph.D. sandwich (6 months)	3	121.435,20
2022	Young talent with experience abroad – A (6 months)	1	59.155,29
2022	Visiting professor in Brazil (6 months)	1	95.155,29
2019	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2022	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Postdoctoral degree with experience abroad (6 months)	2	71.510,58
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2020	Ph.D. sandwich (6 months)	2	80.956,80
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Ph.D. sandwich (6 months)	2	80.956,80

Other actions not related to projects R$ 0,00

THEME

Innovation in Basic Sciences

International Cooperation Projects

Name of the project	Start date	End date
Numerical and theoretical analysis of physical systems	01/08/2018	31/07/2022

Description

This project is concerned with Numerical and Theoretical analysis of physical systems, more specifically, systems that are oriented by partial differential equations, and it is proposed by faculty members of the Mathematics postgraduate program. The program was started in 1968 offering training at the master's level and subsequently, at the doctoral level in 1986. Both of these programs received strong ratings by CAPES (Brazilian Coordination for the Improvement of Higher Level Personnel). The scientific production of faculty members is well-recognized within local standards, qualifying the department as one of the best in the country. The program is rated 5 (classified as very good) by CAPES. This proposal is presented by members of the Linear differential equations research team, which, although it includes many young researchers and was only recently established, has a very expressive scientific production with papers published in competitive, high-level scientific journals with significant visibility and impact. The members of the research team have already established active collaborations with researchers associated with many institutions abroad. Therefore, this proposal is focused on mobility for the researchers involved, in order to strengthen the existing collaboration as well as initiate new ones as the project is being executed. This proposal will expand the internationalization of the program and, consequently, the internationalization of UFPE by strengthening the program and elevating it to another level of scientific production**.**

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2020	3	39.089,00
2021	3	22.529,00
2022	1	15.790,00
2019	3	30.809,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2019	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Ph.D. sandwich (12 months)	1	76.276,80
2019	Ph.D. sandwich (12 months)	1	76.276,80
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Ph.D. sandwich (12 months)	1	40.478,40
2020	Ph.D. sandwich (12 months)	1	40.478,40
2019	Visiting professor in Brazil (15 days)	1	16.155,29
2022	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Visiting professor in Brazil (15 days)	1	16.155,29
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Ph.D. sandwich (12 months)	1	76.276,80

Name of the project	Start date	End date
New Perspectives on the Internationalization of Physics and its Multidisciplinary Applications	01/08/2018	31/07/2022

Description

This project aims to strengthen and consolidate the international competitiveness of the Post-graduate Program (PGP) of the of Physics Department of at UFPE (DF-UFPE), through actions aimed at facilitating the mobility of teachers and students from the PGP of the DF-UFPE, as well as the mobility of teachers of foreign institutions coming to the DF-UFPE. In fact, in this project we propose a research agenda, meeting international standards, on a diversity of topics of relevance and global impact, which will reveal new perspectives on the internationalization of multidisciplinary research in physics, with special emphasis on our students who will be exposed to highly qualified international institutions abroad, and to our program by hosting high-level scientists from acclaimed institutions to interact locally, working on common research problems, as well as offering their expertise in innovative research topics. In particular, regarding the research activities proposed in this project, they will focus on: # 1 Finding New Solutions in Field Theory and General Relativity # 2 Investigating the solid-liquid transition for two-dimensional structures with square and mixed symmetry and presence of density gradients # 3 Atomic Physics and Quantum Optics # 4 Collective neuronal phenomena: collective oscillations and criticality # 5 Spintronic, spin glasses, amorphous and disordered materials, NanoMagnetism and micromagnetic simulation # 6 Tradeoffs, division of tasks and evolution of complexity # 7 Nonlinear and Biophotonic Photonics # 8 Quantum Networks in Clouds of Cold Atoms # 9 New topological structures in superconductors and chiral magnets.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	5	64.037,00
2020	7	102.179,00
2021	7	101.880,00
2019	5	73.793,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2022	Visiting professor in Brazil (1 month)	4	92.621,16
2020	Ph.D. sandwich (12 months)	1	76.276,80
2021	Ph.D. sandwich (12 months)	2	152.553,60
2022	Ph.D. sandwich (12 months)	1	76.276,80
2019	Visiting professor in Brazil (1 month)	4	92.621,16
2021	Visiting professor in Brazil (1 month)	5	115.776,45
2019	Training (1 month)	1	15.458,40
2020	Training (1 month)	1	15.458,40
2020	Visiting professor in Brazil (1 month)	5	115.776,45
2021	Training (1 month)	1	15.458,40
2019	Ph.D. sandwich (12 months)	1	76.276,80
2022	Training (1month)	1	15.458,40

Name of the project	Start date	End date
Internationalization of the Post-graduate Program in Chemistry at UFPE via Synthesis, Characterization, Analysis, Modeling, and Applications of New Chemicals and Materials.	01/08/2018	30/06/2022

Description

The production of new compounds, biomolecules, and materials with specific applications requires synthetic and preparation methods the state of the art of which must comply with the principles of green chemistry / materials (e.g. solvent-free synthesis, metallic and organic structures - MOFs, nanoparticles, bio-inspiration/biomimetics, printable materials and devices) as well as in silico design (e.g. computational modeling and chemometrics) to save resources. New compounds and materials certainly require the latest characterization and analysis techniques especially for chiral compounds (e.g., NMR in oriented media) and systems that contain many responses and variables (e.g., chemometrics). It is clear that in order to aid in the specific applications of new compounds, biomolecules, and materials, it is essential to understand their mechanisms of action, which requires techniques (e.g., computational simulations of Nano and biostructures and their interactions and interfaces, advanced chemometrics, bio-measurements in vivo) and the complete integration theory-modeling-experiment. Green chemistry is a rapidly evolving area of major academic and industrial importance that aims to develop sustainable chemical processes by increasing material efficiency and energy consumption. The usage of solvents is an important source of energy inefficiency of chemical reactions and processes, since most of the thermal energy supplied to induce a chemical reaction/process is lost by heating the solvent. Therefore, eliminating the usage of solvents in a chemical process would significantly improve their sustainability, safety and energy efficiency. One of the objectives of this project is to determine, at a strategic level, the value of applying green methods for the synthesis of new compounds or complexes. One of the main focuses of the initial efforts will be the use of mechanic-chemical and environmentally friendly reactions. It is hoped that a systematic investigation of such transformations will lead to a detailed understanding of their scope and limitations and provide useful paradigms by which complex systems can be accessed more easily.

Resources to maintenance the projects

Year	Amount (R$)
2022	5.000,00
2019	15.000,00
2020	10.000,00
2021	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	3	121.435,20
2021	Ph.D. sandwich (6 months)	2	80.956,80
2022	Ph.D. sandwich (6 months)	2	80.956,80
2019	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2021	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2020	Visiting professor in Brazil (15 days)	3	48.465,87
2019	Senior visiting professor abroad (6 months)	1	65.678,40
2019	Visiting professor in Brazil (15 days)	3	48.465,87
2019	Ph.D. sandwich (6 months)	3	121.435,20
2022	Visiting professor in Brazil (15 days)	3	48.465,87
2021	Senior visiting professor abroad (6 months)	1	65.678,40
2020	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2022	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2021	Visiting professor in Brazil (15 days)	3	48.465,87
2022	Senior visiting professor abroad (6 months)	1	65.678,40
2020	Senior visiting professor abroad (6 months)	1	65.678,40

Name of the project	Start date	End date
Innovations in MEMs and Nanodevices for Microwave, Terahertz, and Photonic Applications.	01/08/2018	31/07/2022

Description

The purpose of this international cooperation proposal is to design, optimize, manufacture, and characterize innovative microelectromechanical (MEM) devices and devices with potential applications in the development of sensors and systems, operating in microwave, terahertz (THz) and the spectral region of near infrared. The cooperation involves research in the area of Photonics of the Post-graduate Program in Electrical Engineering (PGPEE) at UFPE. The research groups that interact with the PGPEE professors are from the Technological Institute of Telecommunications of Catalonia, Spain; McGill University, Canada; Imperial College, England, and Chonbuk National University, South Korea. The research topics to be explored are in principle the following: • Innovative configurations and applications of nanodevices and plasmid MEMs in the near infrared. • Innovative microwave devices for sensing and telecommunications. • Selective Frequency Surfaces (FSS) for THz applications. • Spectroscopy of surface plasmas located in nanoparticles for the development of innovative biosensors.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	1	19.876,00

Resources to maintenance the projects

Year	Amount (R$)
2019	5.000,00
2021	5.000,00
2022	5.000,00
2020	5.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (12 months)	1	76.276,80
2020	Ph.D. sandwich (12 months)	1	76.276,80
2020	Senior visiting professor abroad (4 months)	1	48.470,40
2020	Visiting professor in Brazil (15 days)	3	48.465,87
2022	Ph.D. sandwich (6 months)	1	40.478,40
2019	Senior visiting professor abroad (4 months)	1	48.470,40
2019	Ph.D. sandwich (12 months)	1	76.276,80
2020	Senior visiting professor abroad (3 months)	1	39.866,40

Missions not linked to projects R$ 0,00

Scholarships Not Related to Research Projects

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	35.755,29
2022	Ph.D. sandwich (6 months)	3	121.435,20
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Ph.D. sandwich (6 months)	2	80.956,80
2022	Postdoctoral degree with experience abroad (6 months)	2	71.510,58
2019	Young talent with experience abroad –A (6 months)	1	59.155,29
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Young talent with experience abroad –A (6 months)	1	59.155,29
2019	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2019	Ph.D. sandwich (6 months)	3	121.435,20
2021	Ph.D. sandwich (6 months)	2	80.956,80
2020	Visiting professor in Brazil (6 months)	1	95.155,29
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2022	Visiting professor in Brazil (15 days)	2	32.310,58

Other actions not related to projects R$ 0,00

THEME

State and Society in Global Contemporaneity: Dynamics of Inequality and Development

International Cooperation Projects

Name of the project	Start date	End date
The reception of the work of Pierre Bourdieu in Brazilian Sociology	01/08/2018	30/06/2022

Description

This project aims to reconstruct a network of international scientific cooperation around the work of sociologist Pierre Bourdieu. Bourdieu is recognized worldwide as one of the leading theorists and analysts of social inequality. Our focus will be on the reception of his work in Brazilian Sociology. But the research of the Brazilian case will be part of a broader investigation that coordinates French, Brazilian, North American, and other Latin American researchers on the problem of the circulation of Bourdieu's ideas in the American continent (L'internationalisation des sciences social: Pierre Bourdieu et les Amériques - Revisiter les archives d'une internationale scientifique in the Context of Global Science, Poupeau et Pérez, 2017). This transnational project is led by Franck Poupeau (Director of Research at the Center National de RechercheScientifique - CNRS). The French team is complemented by Jean-Baptiste Comby (Panthéon-Assas / Paris II University) and Amin Pérez, of the Institute for Advanced Studies at Princeton University. Poupeau and Pérez are members of the committee responsible for Bourdieu's archives at the École Pratique de Hautes Etudes. The three researchers are already in close contact with the Brazilian team that will focus on receiving the work of Bourdieu on the sociology of the country. This part of the project that is the object of this proposal will be coordinated by Prof. Maria Eduarda da Mota Rocha (PGPS-UFPE). The major project that the research coordinated by the PGPS-UFPE will be part of aims to clarify the processes that made possible the internationalization of the social sciences from the perspective of the dissemination of Bourdieu's work in the American continent and to constitute a transnational network of researchers revisiting the empirical objects of studies favored by the French author and his main mediators in the American continent, now in the context of Global Science. In this sense, the research itself will reconstruct Bourdieu's attempt to coordinate an international network of researchers dedicated to the theme of social inequality in its various facets - what could be called a "scientific international". The process of internationalization of sociology, the "transatlantic" circulation of ideas, concepts, theories, and methodologies is the ultimate goal of this project, as well as understanding the way in which such theoretical and methodological support contributed to the understanding of Brazilian society.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	2	31.579,00

Resources to maintenance the projects

Year	Amount (R$)
2019	5.000,00
2020	5.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2019	Visiting professor in Brazil (6 months)	1	95.155,29
2019	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40
2019	Senior visiting professor abroad (6 months)	1	65.678,40

Name of the project	Start date	End date
Globalization of Agriculture and Social Inequalities: Public Policies, Food, Working Conditions, and Gender Relations.	01/08/2018	30/06/2022

Description

This project is part of the field of Sociology of Agriculture and Food with special attention to the understanding of production spaces to those of food distribution and consumption. The processes that involve the production, distribution and consumption of food are given on the basis of inequalities that extend from the limits of access to land to the fragile reproductive conditions of family production units; working conditions and situations of vulnerability of migrant workers in rural areas. The strong power of global corporations over labor and workers is observed in order to ensure the traceability of products and the rapid movement of goods, certified and labeled according to quality parameters. However, the broad scope of food quality, while taking into account phytosanitary practices and attention to good agricultural practices, lacks the same kind of care for workers who, despite these controls, according to the demands of consumers and their distributors, are exposed to situations of continued precariousness, low wages, and informality and fragile employment relations. Seasonal contracts and lengthening of the commute to work inhibit their organization. In a situation of continued vulnerability, this category of workers tends, in general, to fear exposure in public spaces and to face the barriers that present themselves. With globalization, forms of exploitation and subordination of the workforce are exacerbated globally, as we have seen elsewhere (Bonanno & Cavalcanti, 2014), but studies on workers have not yet been sufficient to account for the forms which are assumed in particular contexts of export agriculture, driven by the need to analyze the specificities and generalities of these processes and to deepen the study of the mobility and vulnerabilities of workers, as well as the changes in agriculture and in the organization of workers. Work and research, in continuity to projects underway, supported by CNPq, and others involved in this international collaboration. We will continue adopting a broad perspective of observation of the phenomenon of globalization and inequalities, without losing the local references of the goals of the Globalization and Agriculture research groups coordinated by the Rural Studies Laboratory.

Resources to maintenance the projects

Year	Amount (R$)
2019	7.000,00
2020	3.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	1	40.478,40
2021	Junior Outdoor Visiting Professor (3 months)	1	36.986,40
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2019	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Senior visiting professor abroad (3 months)	1	39.866,40
2020	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Ph.D. sandwich (6 months)	2	80.956,80
2020	Senior visiting professor abroad (3 months)	1	39.866,40

Name of the project	Start date	End date
The "post-colonial" in the Portuguese-speaking world and the place of African literatures in "world literature".	01/08/2018	30/06/2022

Description

In the last decades of the 20th century, Cultural Studies and Literary Studies have merged into one area. This entails a complex process that occurred within the humanities as an attempt to respond to emerging challenges arising from the struggles for liberation in the African and Asian continents, on the political and ideological levels, and the so-called "linguistic turn" on the epistemological plane. The world order was affected by processes of conquest and independence and also by the persistence of a cultural "superdiversity" alongside homogenizing processes (globalization). Such transformations and lasting impacts demanded the production of new perspectives on cultural phenomena. As far as Cultural Studies are concerned, the emergence of a theoretical field called Post-Colonial Studies / Theories stands out. In the field of Literary Studies, after the wide dissemination of Comparative Literature, the concept of World Literature emerged in the late twentieth century in an epistemological gesture of inclusion of literatures that were not considered to belong to the "Western-centric" canon of literary theory, which "brought countless contributions to a possible corpus of 'world literature.'" The proposal we present inquires as to the limits and possibilities of such theoretical references by placing the focus of the analysis on literatures produced in the Portuguese language and on African literatures in a broader sense, yet linguistically limited to the colonial "African literatures in Portuguese, Spanish, English, French", etc. To what extent are the assumptions of postcolonial theories and their theoretical contributions reproducing rationales based on national identities, typical of the "colonial era"? To what extent does the concept of world literature, by suggesting the questioning of the paradigm of national literatures, neglect fundamental aspects such as domination, hegemony, and power of complex national, regional, international, and transnational frameworks? What are the clashing forces (or alliances) triggered by the various political, social, and cultural institutions, whether they be nation-states, educational policies and programs, publishers, writers, literary prizes, academic production and debate, among others? The objective is to problematize contemporary theoretical concepts and references that deal with the place of cultural production and spaces of power and domination, with emphasis on Portuguese literature.

Resources to maintenance the projects

Year	Amount (R$)
2019	5.000,00
2020	5.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (6 months)	1	40.478,40
2020	Ph.D. sandwich (6 months)	2	80.956,80
2021	Ph.D. sandwich (6 months)	1	40.478,40
2020	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Senior visiting professor abroad (3 months)	1	39.866,40
2020	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Visiting professor in Brazil (1 month)	1	23.155,29

Name of the project	Start date	End date
Development and Inequalities in the Global South: Suppression of Rights and Socio-Political Implications in the Life and Work of the Peripheral Populations.	01/08/2018	30/06/2022

Description

Since the 1970s, the capitalist world has been in a crisis scenario with cycles of economic growth that, under financialization and austerity measures, have impacted life on a planetary scale. The neoliberal development models and strategies implemented by nation-states from the State Reform and the recommendations of the multilateral development agencies have not succeeded in recovering the global growth of capitalist dynamics and reducing the inequalities inherent in this system. On the contrary, they have reiterated the expressions of these inequalities and advanced, particularly in the countries of the Global South. The societal transformations whose strongest expressions are linked to changes in the world of work have led to the emergence of new phenomena in global societies: precariousness of labor, feminization of the labor market, conflicts over access to natural resources, massive migrations, forced spatial displacements, impoverishment on a world scale, emergence of conservative movements, and others. These phenomena have generated conflicts and social tensions and are crossed by the dimensions of gender, race, and ethnicity, impelling the organization of struggles and social movements that impugn the suppression of rights, their commercialization and the impacts on the life and work of the peripheral populations. As multilateral agencies recognize, the unsustainability of economic models for growth has generated an unprecedented concentration of wealth on the planet and has not solved inequality. The United Nations (UN) Sustainable Development Agenda 2030 proposes global action to guide new global development strategies that have an impact on the effects of inequality and its diverse expressions. It should be clear that these inequalities are expressed and revealed at different levels depending on the socio-historical formations of the countries, the degree of state intervention in the economy, the structure, functioning, and control of institutions, the organization and intervention of the subjects' social policies. Within the framework of this contextualization, the research themes of the Project are articulated around contemporary phenomena that gain worldwide visibility, constituting themselves in priority areas of the production of knowledge. Its timeliness and pertinence are enriched by being intertwined with the research objectives of our international partners.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	2	36.474,00
2019	2	39.556,00
2020	1	17.680,00

Resources to maintenance the projects

Year	Amount (R$)
2020	10.000,00
2022	10.000,00
2019	10.000,00
2021	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	2	80.956,80
2022	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2019	Visiting professor in Brazil (1 month)	1	23.155,29
2020	Visiting professor in Brazil (1 month)	3	69.465,87
2020	Young talent with experience abroad – A (6 months)	1	59.155,29
2021	Visiting professor in Brazil (1 month)	2	46.310,58
2021	Junior Outdoor Visiting Professor (1 month)	1	60.638,40
2022	Ph.D. sandwich (6 months)	3	121.435,20
2020	Senior visiting professor abroad (6 months)	1	65.678,40
2020	Ph.D. sandwich (6 months)	3	121.435,20
2021	Senior visiting professor abroad (6 months)	1	65.678,40
2022	Visiting professor in Brazil (1 month)	1	23.155,29
2019	Ph.D. sandwich (6 months)	2	80.956,80

Name of the project	Start date	End date
Scientific cooperation between the Post-graduate Program in Political Science of the Federal University of Pernambuco and the Latin American Center / St Antony's College, Oxford University - An interdisciplinary study on corruption in Brazil	01/08/2018	31/07/2022

Description

This proposal intends to achieve the following results: (1) knowledge transfer; (2) interinstitutional production and (3) teacher and student mobility. The proposal foresees an as of yet unpublished study on corruption in Brazil. The theme choice is justified by scientific and social criteria. Technically, corruption is a transversal issue to the interests of the research team. The research design adopts an interdisciplinary perspective, combining different measurement strategies. Within this perspective, our proposal foresees the organization of an original database with approximately 40,000 convictions judged in Brazil between 1992 and 2018. Among other analyses, it will be possible to estimate the average time to produce a conviction, the frequency of cases of corruption and administrative improbity by unit of the federation, and the level of punishment by the Brazilian courts of the cases detected. To complement the analysis, we will examine the National Penitentiary Department's disaggregated data in order to identify the profile of those convicted of corruption. From the comparison between those charged and convicted, our research will produce the largest original observational diagnosis of the incidence of corruption in the country. Finally, we will systematize and analyze the data produced by the General Comptroller of the Union (CGU) from the Public Lottery Surveillance Program. In short, our proposal has the following advantages. First, it examines corruption from a multidimensional perspective (perception, convictions, incarceration and surveillance). Second, it compiles the most extensive database on corruption in Brazil. Third, by investing in a transparency strategy, all data and computer scripts will be made available in public institutional repositories such as the Open Science Framework (OSF) and Dataverse. This measure is important because it facilitates the reproducibility of the results and ensures the publicity of the information. In substantive terms, this project has the potential to improve our knowledge of corruption and thus assist government managers in formulating and implementing policies specifically designed to address this problem.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2019	2	31.578,00
2020	1	26.446,00
2021	1	15.790,00

Resources to maintenance the projects

Year	Amount (R$)
2019	10.000,00
2020	10.000,00
2021	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	2	80.956,80
2020	Ph.D. sandwich (6 months)	3	121.435,20
2020	Senior visiting professor abroad (6 months)	1	65.678,40
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2022	Ph.D. sandwich (6 months)	2	80.956,80
2019	Ph.D. sandwich (6 months)	3	121.435,20
2019	Junior Outdoor Visiting Professor (6 months)	2	121.276,80
2021	Senior visiting professor abroad (6 months)	1	65.678,40
2021	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2019	Visiting professor in Brazil (15 days)	1	16.155,29

Missions not linked to projects R$ 0,00

Scholarships Not Related to Research Projects

Year	Modality	Quantity	Amount (R$)
2022	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2021	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2021	Ph.D. sandwich (6 months)	2	80.956,80
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Young talent with experience abroad –A (6 months)	1	59.155,29
2022	Young talent with experience abroad –A (6 months)	1	59.155,29
2022	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Ph.D. sandwich (6 months)	2	80.956,80
2019	Ph.D. sandwich (6 months)	3	121.435,20
2022	Ph.D. sandwich (6 months)	3	121.435,20
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Postdoctoral degree with experience abroad (6 months)	2	71.510,58

Other actions not related to projects R$ 0,00

THEME

Innovation in Health

International Cooperation Projects

Name of the project	Start date	End date
Health Innovation in Systemic Sclerosis: development of new therapeutic approaches, diagnosis and evaluation of health expenditures	01/11/2018	30/06/2022

Description

Systemic sclerosis (SS) is a connective tissue disease of unknown etiology, characterized primarily by progressive fibrosis of the skin and internal organs. Despite being a relatively rare disease, it is considered of extreme importance within rheumatology, considering its important impact on the quality of life of the affected individual and his/her respective prognosis. The prevalence and incidence of SS varies according to geographic region and criteria used for diagnosis. The presence of severe clinical manifestations associated with the absence of effective treatment translates into a high mortality rate, about 3.5 times higher than that estimated for individuals of the same sex and age. Therapeutic options for SS are focused essentially on the treatment of symptoms and do not have a significant impact on the progression of the disease. There is a clear need for scientific studies that seek the discovery of new drugs and new therapeutic targets that can be incorporated into the treatment of this disease. The present proposal aims at the development of new therapeutic alternatives, besides using electrochemical and optical techniques for the development of a biosensor for the detection of analytes present in the serum of SS patients, more precisely, autoantibodies. In addition, it aims to evaluate the efficacy, cost-effectiveness, and economic efficiency of the development of this project for early diagnosis and therapy of SS. The project has three main objectives: I) Development of new therapeutic alternatives for SS through the evaluation of the immunomodulatory and antifibrotic activity of new thiazolidine derivatives in systemic sclerosis and in experimental models. II) Development of new alternatives for ES diagnosis through the development of a miniaturized diagnostic platform for the diagnosis of SS through the integration of microsystems, microelectronics, and nanostructured biosensors technology to identify the disease in human samples. III) Finally, the project will evaluate the efficacy, cost-effectiveness and economic efficiency of the development of this project for early diagnosis and treatment of SS. Therefore, for the full execution of the project, work assignments will be carried out by national and international professors / researchers, as well as the training of highly qualified human resources through doctoral-level exchange programs and co-supervision of doctoral research.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	2	22.356,00
2019	3	33.534,00
2020	2	22.356,00
2021	2	22.356,00

Resources to maintenance the projects

Year	Amount (R$)
2019	10.000,00
2021	10.000,00
2022	10.000,00
2020	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2020	Ph.D. sandwich (6 months)	3	121.435,20
2021	Ph.D. sandwich (6 months)	3	121.435,20
2022	Ph.D. sandwich (6 months)	3	121.435,20
2019	Senior visiting professor abroad (3 months)	2	79.732,80
2022	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Ph.D. sandwich (6 months)	1	40.478,40
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Senior visiting professor abroad (3 months)	1	39.866,40
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Senior visiting professor abroad (3 months)	1	39.866,40

Name of the project	Start date	End date
Discovery and development of new antifungal compounds capable of reversing antifungal resistance.	01/08/2018	31/07/2022

Description

The biological mechanisms involved in fungal infections are not yet fully understood. In addition, a major concern involves the epidemiological understanding and characterization of emerging Candida species. In particular, systemic infections by emerging yeasts such as Candida auris, C. ciferrii, C. famata, C. guilliermondii, C. haemulonii, C. lusitaniae and C. pelliculosa among others, which increase the mortality rate, especially when associated with serious underlying pathologies, use of medical devices and antifungal resistance. Thus, identifying epidemiological trends associated with the emergence of resistance to antifungal drugs directly reflects the higher likelihood of survival of patients with systemic candidiasis— therefore explaining the lower mortality rate. Previous studies to improve therapeutic methods have been developed with cercosporamide, a natural product isolated from a phytopathogenic fungus Cercosporidium henningsii. Interestingly, it appears to act as a potent ATP-competitive inhibitor CaPkc1 with an IC 50 of 44nM. In addition, cercosporamide inhibited human PKC (IC 50 = 1 µM) and PKCβ (IC 50 = 0.3 µM) and then appeared to inhibit other human kinases, including Mnk1 / 2, Jak3, GSK3ß, ALK4 and Pim1, from nanomolar to low micromolar ranges. Heterocyclic compounds play an antifungal activity, but with regard to cercosporamide there is no information in the literature. Consequently, during our successful attempts to find biologically active compounds, cercosporamide has inspired the development of derivatives. To do this, we plan to synthesize new dibenzofuran antifungal agents and determine their mechanisms of action. This project will bring together three research groups with different and complementary clinical, technological, and scientific knowledge to build a solid international collaboration between UFPE, the University of Nantes in France, and the Javeriana University in Colombia in the field of medical mycology, proteomics, and development of medicines. Researchers and the mobility of doctoral students will allow us to make the most of the experience of each team, placing UFPE at the frontier of developing knowledge on new antifungal treatments, reaching a robust position in the world scene with emphasis on patents and scientific production.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2019	2	43.460,00
2021	1	26.446,00

Resources to maintenance the projects

Year	Amount (R$)
2019	10.000,00
2020	10.000,00
2021	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (12 months)	1	76.276,80
2019	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2021	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Ph.D. sandwich (12 months)	1	76.276,80
2019	Ph.D. sandwich (12 months)	1	76.276,80
2021	Ph.D. sandwich (12 months)	1	76.276,80
2019	Visiting professor in Brazil (15 days)	1	16.155,29

Name of the project	Start date	End date
Innovation in vaccine strategies against HPV-related cancers	01/08/2018	31/07/2022

Description

Several studies point to the efficacy of DNA vaccines in animal models. Although DNA vaccines do not demonstrate the same efficacy in humans compared to that seen in animal models, several clinical studies for different DNA vaccines have been conducted. This is due to new strategies to increase absorption, expression stability, and modulation of the immune system. Some DNA vaccines have already been used in animals and a DNA vaccine against the West Nile virus has already been released in the US for vaccination of horses. Even a Zika virus vaccine has been developed and shows good pre-clinical results. Papillomaviruses induce the formation of warts or papilloma. These lesions are usually benign but can turn into malignant tumors. The association between certain types of HPV and the etiology of cervical cancer is now recognized. Today there are two vaccines released in Brazil, both prophylactic, against HPVs 16 and 18. However, these commercial vaccines leave out at least 13 other HPVs responsible for almost 30% of all cases of cervical cancer, in addition to requiring two doses for protection, which makes it more expensive to adopt in public vaccination programs, especially in developing countries. In addition, so far there are few alternatives for the treatment of cervical cancer and none of them guaranteed efficacy. This causes this type of cancer to have a high mortality rate among young women. It was found that shortly after HPV infection there is mRNA expression and HPV E5 protein production at detectable levels in low grade lesions. Therefore, when E5 is expressed in the early stages of infection, these lesions have few tumor cells. We believe that effector cells present in pre-malignant lesions should eradicate tumor cells more efficiently than invasive cancer. Recent preclinical studies in our group confirm the viability of E5 as a vaccine antigen. The general objective of this project is to consolidate scientific research and technological development in DNA vaccines in Brazil, especially in the Northeast region of Pernambuco, contributing to establishing advanced treatments for cervical cancer that are still incurable and difficult to handle by conventional methods, as well as to promote interaction of the different levels of scientific research with possibility for entrepreneurial initiatives in this area of science.

Resources to maintenance the projects

Year	Amount (R$)
2019	10.000,00
2020	10.000,00
2021	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40
2019	Ph.D. sandwich (6 months)	1	40.478,40
2020	Ph.D. sandwich (6 months)	2	80.956,80
2020	Ph.D. sandwich (12 months)	1	76.276,80
2021	Visiting professor in Brazil (1 month)	1	23.155,29

Name of the project	Start date	End date
Innovative nanosystems for controlled release drugs: development and characterization.	01/08/2018	30/06/2022

Description

The main objective of the proposal presented by the Post-graduate Program in Biological Science (PGPBS) is the training of doctoral students under the co-tutelage of the University of Paris (UPSud-Saclay) and assign Brazilians postdocs, with experience abroad, either in the academy or in the pharmaceutical industry, highly competent in the area of nanobiotechnology. Therefore, translational actions of innovative nanotechnology using biomaterials of the fauna and flora of the Brazilian north-northeast is proposed, for the research, design, and innovation of nanosystems of controlled release drugs, either of natural origin or synthetic, to be orally administered and used in the treatment of infectious diseases and the central nervous system; bilateral work missions, with courses and lectures by French researchers to be taught at UFPE via the Doctoral School of Innovation in Health on pharmaceutical nanobiotechnology. Controlled release of drugs is a very active field of research and will continue to be a cutting-edge topic in the coming years. Initially, many "small molecules" (poorly insoluble in water and / or hydrophilic and poorly permeable through membranes) still present low or inconsistent bioavailability problems. Second, the explosion in the market for biotech drugs, including not only proteins, antibodies, drug-antibody conjugates (ADCs), but also fragile peptides and nucleic acid derivatives, makes it necessary to develop and produce systems specifically designed for these new materials. Overall, considerable advances in nanotechnology have made possible the emergence of auto-active nanomedicines. In addition, bioactive molecules from the synthesis of plant and food by-products will be studied, aimed at encapsulation in nanosystems to improve their health promoting properties. Based on our long-term collaboration, the overall objective of this project is to coordinate our efforts by working on selected topics that are ongoing projects in our respective teams or that we can rapidly activate on both sides to meet the demand for resource formation at the doctoral level. In addition to the scientific results and their value, this collaboration will establish an international doctoral school of education dedicated to students interested in the innovation of nanotechnology-based controlled release drug. Moreover, bioactive molecules derived from synthesis of plant and food by-products shall be studied, aimed at encapsulation in nanosystems to improve their health promoting properties.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2020	1	25.114,00
2019	1	25.114,00
2022	1	25.114,00
2021	1	25.114,00

Resources to maintenance the projects

Year	Amount (R$)
2020	10.000,00
2021	10.000,00
2019	10.000,00
2022	10.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Ph.D. sandwich (12 months)	2	152.553,60
2019	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (12 months)	1	76.276,80
2019	Postdoctoral degree with experience abroad (12 months)	2	138.621,16
2019	Visiting professor in Brazil (15 days)	1	16.155,29
2022	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Ph.D. sandwich (6 months)	2	80.956,80
2020	Ph.D. sandwich (12 months)	1	76.276,80
2021	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	1	16.155,29

Missions not linked to projects R$ 0,00

Scholarships Not Related to Research Projects

Year	Modality	Quantity	Amount (R$)
2021	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2020	Ph.D. sandwich (6 months)	2	80.956,80
2019	Ph.D. sandwich (6 months)	3	121.435,20
2020	Young talent with experience abroad (6 months)	1	59.155,29
2022	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Postdoctoral degree with experience abroad (6 months)	2	71.510,58
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Young talent with experience abroad (6 months)	1	59.155,29
2021	Ph.D. sandwich (6 months)	2	80.956,80
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2022	Ph.D. sandwich (6 months)	3	121.435,20
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2022	Postdoctoral degree with experience abroad (6 months)	1	35.755,29

Other actions not related to projects R$ 0,00

THEME

System Modeling

International Cooperation Projects

Name of the project	Start date	End date
Fundamentals, Methods, Computational Systems and Social Use	01/08/2018	31/07/2022

Description

This project proposes two major themes: (i) Informatics and society; (ii) Fundaments, Methods and Computational Systems. The first theme addresses relevant problems linked to the real world and with repercussion in society. This issue must have measurable repercussions in society. The second theme encompasses subtopics of basic or fundamental research. Usually, it deals with definitions of models and methods, determination of its properties of proposition and implementation of computational systems. A set of sub-themes is linked to each of the two themes proposed. The subthemes listed for each of the themes regards the research in progress, at different stages of maturity offering some type of internationalization. Both themes and sub-themes allow basic research or applied from different areas of concentration, individually or in associations. The sub-themes chosen for this internationalization project include: Informatics and Society: Informatics and engineering; Informatics and humanity; Informatics and health; big data and cloud computing; smart cities and internet of things; specification, validation and verification of systems and processes; informatics and fourth industrial revolution; digital games and entertainment; robotics, autonomous and interactive systems; and cyber security. Fundamentals, Methods and Computational Systems: Computer systems engineering; software engineering and programming language; data management and retrieval of information; computer intelligence and artificial intelligence; media and interaction; computer networks and distributed systems; theory and fundaments of computing.

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2019	Senior visiting professor abroad (3 months)	4	159.465,60
2020	Ph.D. sandwich (10 months)	1	66.268,80
2019	Ph.D. sandwich (10 months)	1	66.268,80
2021	Ph.D. sandwich (10 months)	2	132.537,60
2022	Ph.D. sandwich (10 months)	2	132.537,60
2021	Senior visiting professor abroad (3 months)	4	159.465,60
2020	Junior Outdoor Visiting Professor (6 months)	2	121.276,80
2021	Junior Outdoor Visiting Professor (6 months)	2	121.276,80
2022	Junior Outdoor Visiting Professor (6 months)	2	121.276,80
2022	Senior visiting professor abroad (3 months)	4	159.465,60
2020	Senior visiting professor abroad (3 months)	4	159.465,60
2019	Junior Outdoor Visiting Professor (6 months)	2	121.276,80

Name of the project	Start date	End date
International Co-operation in Electrical Engineering: Communication and Signal Processing	01/08/2018	30/06/2022

Description

This project aims to investigate topics related to two important areas of research in Electrical Engineering: Communication and Signal Processing. In Signal Processing, there is the aim to develop new concepts and techniques in the scope of Digital Signal Processing on graphs (DSP), studying its potential applicability to the resolution of real world problems. Examples of systems, the structure of which can be modeled by a graph whose vertices are associated with variables of interest, are (i) measurements on a set of sensors and Internet of Things devices, (ii) numbers of citations in a scientific collaboration network, or (iii) attributes of 3D virtual objects, (iv) levels of interaction between individuals in an ecosystem, and (v) signals which propagate along brain connections. The general objective is to obtain improvements in the treatment of distributed information about these structures, demonstrating with the use of GSP tools, that it is possible to analyze aspects and evaluate transparent properties of the classic Signal Processing tools. The Communications aim to find new convolutional codes with high rates and to design new communication systems based on the topology of chaotic attractors. More specifically, the aim is to analyze the computational complexity, in terms of arithmetic operations, and the performance related to the bit error rate, when the turbo decoder is applied to representations of conventional, minimum, and sectioned trellises. Furthermore, we will propose methodologies to construct communication systems based on three-dimensional chaotic attractors and evaluate the performance of these systems in noisy channels. This project involves two research groups associated to the Post-graduate Program in Electrical Engineering at UFPE, which have maintained well established international collaborations and has discovered new opportunities for interaction in this field. The proposed themes are current and have received considerable attention from researchers at several international universities and from the industry.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	1	13.911,00
2021	2	29.333,00
2020	1	13.911,00

Resources to maintenance the projects

Year	Amount (R$)
2021	5.000,00
2019	5.000,00
2022	5.000,00
2020	5.000,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Junior Outdoor Visiting Professor (6 months)	1	60.638,40
2020	Ph.D. sandwich (6 months)	1	40.478,40
2022	Visiting professor in Brazil (15 days)	1	16.155,29
2020	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Visiting professor in Brazil (15 days)	1	16.155,29
2021	Ph.D. sandwich (6 months)	1	40.478,40

Name of the project	Start date	End date
Advances and Innovation in Production Engineering	01/08/2018	31/07/2022

Description

With the objective of promoting advances and innovation in Production Engineering, the main goals addressed in this project are: (1) the development of analytical models to support decision making and (2) the applications of these models in different productive sectors. The developed models are applicable in several areas, such as Organizational Information Systems, Reliability and Maintenance Engineering, Optimization of Production Systems, Optimization of the Supply Chain; Management of Prognostic Health, Evaluation of Systems of Production of Goods and Services, Risk Analysis, among others. From a methodological angle, this research project takes keen interest in models and methods of Multiple Criteria Decision Making (MCDM) and Group Decision and Negotiation (GDN). Furthermore, advanced tools such as those involved in neuroscience studies shall be used to support methodological advances in decision systems and applications. MCDM and GDN are at the frontier of science and technology, with strong applications in organizations to solve problems in several strategic areas defined as priorities in Brazil. The project team members already have established international cooperation efforts which support this proposal, conducting relevant research with international partners. Both research themes embraced by this project have high scientific impact and can place Brazilian research in a competitive position in the global scene, increasing the number of papers published in scientific journals with a high impact factor (ISI). The development of this research can also promote a reduction in the scientific-technological gap in the area of decision support and its applications in the production of goods and services. The expansion and consolidation of the leadership from Brazil on these themes is expected to be developed. The high involvement of students in our research ensures the training of young researchers in accordance with what is expected according to international standards. Students shall have opportunities to engage in strong interactions with outstanding international researchers, internationally recognized for their contributions in their area. Each subproject shall create a compelling and stimulating environment, supporting students attempting to improve their skills and key competencies so as to become prominent researchers.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2022	3	47.369,00
2021	3	47.369,00
2020	4	63.159,00
2019	3	47.369,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Junior Outdoor Visiting Professor (3 months)	1	36.986,40
2020	Visiting professor in Brazil (1 month)	2	46.310,58
2020	Ph.D. sandwich (6 months)	4	161.913,60
2022	Ph.D. sandwich (6 months)	3	121.435,20
2019	Ph.D. sandwich (6 months)	1	40.478,40
2020	Senior visiting professor abroad (3 months)	2	79.732,80
2021	Visiting professor in Brazil (1 month)	2	46.310,58
2019	Ph.D. sandwich (6 months)	3	121.435,20
2019	Training (1 month)	1	15.458,40
2022	Visiting professor in Brazil (1 month)	1	23.155,29
2021	Ph.D. sandwich (6 months)	4	161.913,60
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2021	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Senior visiting professor abroad (3 months)	1	39.866,40
2019	Junior Outdoor Visiting Professor (3 months)	1	36.986,40
2020	Training (1 month)	2	30.916,80
2019	Visiting professor in Brazil (1 month)	2	46.310,58
2019	Ph.D. sandwich (12 months)	1	76.276,80

Name of the project	Start date	End date
MCOPE - Modelling, Computational Simulation & Optimization in Petroleum Engineering.	01/08/2018	31/07/2022

Description

The present proposal focuses on the development of tools for the solution of engineering problems involving computational simulation. The work shall cover a broad range of applications of numerical simulation with high computational cost, such as optimization and uncertainty analysis. The developed strategies shall be applied for simulation and optimization in the management of petroleum reservoirs. These systems have a direct application to oil companies, such as those established with Petrobras about ten years ago. Here, efficient numerical strategies will be developed or used (commercial software) to solve some problems of this application, such as porous flow simulation and geomechanical coupling, which play a fundamental role in the design of optimal and safe petroleum production strategies, among others. In addition, optimization of petroleum production can be conducted using computational fluid flow tools in numerical models of the oil reservoir. This is a very complex and important industrial problem in which the profit from production can be improved, taking into account the uncertainties of the geological properties. The researchers composing the present proposal are part of a research group called PadMec (high-performance processing in Computational Mechanics) and participate in the PGP in Civil Engineering and have extensive experience in the topic of multidisciplinary optimization and numerical and computational simulation applied to different fields of engineering, including Petroleum Reservoir Engineering. The experience of the group is proven by the various articles published in major international journals, as well as activities and collaborations with renowned international groups and industry.

Work missions related to the cooperation project

Year	Quantity	Amount (R$)
2021	2	39.204,00
2019	2	39.204,00
2020	1	19.786,00
2022	1	19.786,00

Resources to maintenance the projects

Year	Amount (R$)
2019	9.500,00
2020	9.500,00
2021	9.500,00
2022	9.500,00

Scholarships related to the cooperation project

Year	Modality	Quantity	Amount (R$)
2021	Ph.D. sandwich (6 months)	1	40.478,40
2021	Ph.D. sandwich (6 months)	1	40.478,40
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2022	Visiting professor in Brazil (15 days)	2	32.310,58
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Visiting professor in Brazil (15 days)	2	32.310,58

Missions not linked to projects R$ 0,00

Scholarships Not Related to Research Projects

Year	Modality	Quantity	Amount (R$)
2022	Young talent with experience abroad - A (6 months)	1	59.155,29
2019	Ph.D. sandwich (6 months)	3	121.435,20
2019	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2021	Young talent with experience abroad - A (6 months)	1	59.155,29
2021	Ph.D. sandwich (6 months)	2	80.956,80
2022	Ph.D. sandwich (6 months)	3	121.435,20
2019	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2022	Visiting professor in Brazil (15 days)	2	32.310,58
2021	Postdoctoral degree with experience abroad (6 months)	1	35.755,29
2022	Postdoctoral degree with experience abroad (6 months)	2	71.510,58
2020	Visiting professor in Brazil (15 days)	2	32.310,58
2020	Ph.D. sandwich (6 months)	2	80.956,80

Other actions not related to projects R$ 0,00

Values of Expected Benefits

Value of Cooperation Projects	R$ 16.222.990,49
Value of Missions not linked to research projects	R$ 0,00
Value of Scholarships not linked to research projects	R$ 4.345.877,33
Value of other actions	R$ 0,00
Project Total Value	R$ 20.568.867,82

COUNTERPART

Internationalization of the curriculum - Incorporation of international themes in the undergraduate and postgraduate classes.

Some PGPs offer regular courses in English. This usually happens in courses that attract foreign students. International visiting professors, in many cases, give lectures in English to post-graduate and (under)graduate students. The post-graduate and (under)graduate curricula are being updated in order to internationalize them. UFPE has encouraged the practice of co-tutorship, dual degrees, and participation of international candidates in the selection processes of post-graduate programs. The legislation was amended to accelerate the recognition of credits from subjects abroad.

International publicity materials production in other languages, including websites of the courses.

All UFPE PGPs with a rating of 5, 6, and 7 possess websites written in English. Some of the PGPs with ratings of 4 and 3 also possess a website in English and work is currently being done on the development of other PGP websites in English. UFPE holds an institutional portfolio written in English, published both in print and digital media. Some centers and department websites are in English, containing detailed information on their activities. The UFPE has a bilingual manual for foreign students which contains information about the city, the local transportation system, accommodations, estimated costs of living, documents necessary for foreign registrations in the country, among others. The international relations board discloses at an international level, the qualities of teaching, research, extension and innovation of the institution.

Training and qualification of staff for the institution internationalization.

UFPE has developed the NUCLI - Language Center, which offers classes in English, Spanish, French, and Italian foreign language acquisition for staff members and students. The modules are offered to the entire academic community (students, lecturers, researchers and administrative assistants) and the process of enrollment, leveling, and placement in classes is done on the MEC website. Staff, assistants, and faculty are encouraged to undertake post-doctoral studies abroad.

Counterparties offered by foreign partnership institutions, when applicable.

International universities shall not charge fees to doctoral exchange students and or UFPE lecturers/professors. Moreover, universities make available the use of their equipment and often may provide input constructive to the experimental part of the research conducted abroad. In some collaborations, foreign universities also provide financial aid to UFPE students and lecturers, such as scholarships, subsidized accommodations, mobility resources, and funding for participation in events.

Other counterparts, when applicable

The University has funded the hiring of international visiting professors, the translation of manuscripts for publication in international journals, and the participation of staff, assistants and students in international events. The university has an international relations board that welcomes international students, faculty, and researchers. UFPE currently holds around 180 active cooperation agreements with international universities and institutions from North America, Canada, South America and the Caribbean, Africa, Asia and Europe, which allow the institutional viability of the Institutional Mobility Program and collaborative actions.

DOCUMENTS

Description	Type	Date
Application-Print-English-UFPE.pdf	Institutional Project of Internationalization in English	21/05/2018 12:31:42
Comprovante de Inscrição	proof of enrollment	09/05/2018 18:28:25
Executive_summary_UFPE.pdf	Executive Summary, in english, of the Plan Institutional aligned to the Project presented in PrInt	09/05/2018 15:25:40
Sumario_Executivo_UFPE.pdf	Executive Summary of the Plan Institutional aligned to the Project presented in PrInt	09/05/2018 14:51:10
Ofício_285-GR_CAPES-PRINT.pdf	Letter of presentation issued by maximum authority (8.2.4 of the Call)	09/05/2018 14:20:11
PLI_UFPE_ing.pdf	Institutional Plan of Internationalization of IES or congener document	05/05/2018 17:18:01
PLI_UFPE_port.pdf	Institutional Plan of Internationalization of IES or congener document	05/05/2018 17:17:21
Jim_cv-2018.pdf	Curriculum Vitae – members foreigners	30/04/2018 15:59:29