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## Exercise Science Academic Programs and Research in Brazil

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### ABSTRACT

*Int J Exerc Sci* 2(2) : 152-156, 2009. The *International Journal of Exercise Science* has enjoyed an association with several students and professionals from Brazil. In this invited editorial, professors from leading institutions in Brazil, Roberto Simão from Rio de Janeiro Federal University, and Jonato Prestes from the Federal University of São Carlos, share information regarding their programs relating to Exercise Science. They have provided information on academic components such as entrance requirements, progression through programs, and professional opportunities available to students following completion; as well as details regarding funding available to students to participate in research, collaboration, and specific research interests.

**KEY WORDS:** Rio de Janeiro Federal University, Federal University of São Carlos, academic curriculum in Exercise and Sport Science, exercise physiology research

### INTRODUCTION

Since its inception, the *International Journal of Exercise Science* has enjoyed the involvement of several students and professionals from Brazil. As our relationship has developed, we felt that it would be an ideal opportunity for our international readership to learn about Exercise Science programs from leading institutions in Brazil. Professors Roberto Simão from Rio de Janeiro Federal University, and Jonato Prestes from the Federal University of São Carlos have graciously taken the time to share insight regarding their programs. Provided are information on academic components such as entrance requirements, progression through the program, a typical school year, and professional opportunities available to students following completion. In addition,

details regarding funding available to students to participate in research, the collaborative process, and specific research interests are provided.

### BACKGROUND OF THE UNIVERSITIES

Prof. Simão: Rio de Janeiro Federal University (UFRJ), created in 1920, has as strategic objective to provide to the Brazilian society means to dominate, to enlarge, to cultivate, to apply and to diffuse the universal patrimony of the human knowledge, qualifying all their members to act as multipliers in transforming actions. For this, it offers 104 graduation courses and 64 courses of Master and PhD degree.

The School of Physical Education and Sports of UFRJ (EEFD/UFRJ) was founded in 1939 and accounts for approximately

2000 students and 90 teachers of Graduation and Masters degree divided into six departments. Their main functions are: a) form professionals to the Physical Education area; b) to print theoretical and practical unity in teaching in the area of Physical Education in the country; c) to diffuse linked knowledge to the area; and d) to accomplish scientific research.

In the 1970's, the school was a pioneer in the organization of laboratories for research in exercise physiology in Brazil and one of the pioneers in the creation of a master degree course in Physical Education. Nowadays the Master degree course counts with a group of 11 responsible PhD for the development of research in the concentration area of the "Biodynamics of the Human Movement", that involves several research lines, but has the focus in exercise physiology and physical conditioning.

Prof. Prestes: Here in Federal University of São Carlos – Brazil, undergraduate students need to go for an admission test according to their chosen area. For example, in Physical Education, students that obtain the higher scores in the biological sciences area will be the best classified. However, they pass for a general test, including Portuguese, Mathematics, Physics and Chemistry. To complete the graduate phase, they will complete courses including: exercise physiology, kinesiology, evaluation and measuring in physical education and biochemistry. The post-graduation course in Physiological Sciences brings up two levels, the masters course and the doctoral course. For admission to the Masters course the student must be approved after a specific physiology test,

curriculum analysis, interview, and advisor acceptance. For the doctoral course the student needs advisor acceptance.

### ACADEMIC CURRICULUM

Prof. Simão: The Graduation course in Physical Education is based on three directions that should function in parallel: teaching, research and extension. In this way, the same ones that develop projects and activities with the community (extension) can also result in the development of scientific research. To make this process possible it is necessary that the course is free and that the graduation students accomplish the integral period at school.

Our school period begins in March and it finishes in December. In the end of the year, the summer vacations happens, it begins in the middle of December and goes to the end of February. In the winter, in July, the classes have a recess of 15 days. The curriculum is based on the formation of Physical Education teachers because in Brazil such formation is demanded to act professionally at schools, health clubs, personal training, clubs and training centers.

Prof. Prestes: For undergraduate and graduate students the year starts in March and finishes in December, one or two weeks before Christmas holiday. The major holydays are in July, about two weeks, and January and February, considered vacation months. In the remaining months the students are constantly busy. Post-graduation students usually have heavier routines because of the laboratory work. Some post-graduation students start their

work in January or February. However, disciplines will not start before March.

In the Federal University of São Carlos, Physical Education undergraduate and graduate students take the basic courses first, for example: General Physiology, Anatomy, Kinesiology and Physical Education Teaching Techniques. The specific courses held up after the basic ones are: Exercise Physiology (Exercise Prescription), Evaluation and Measuring in Physical Education, and Strength Training Prescription, for example. In our Physiological Sciences Post-graduation Program, students have Molecular Biology, Neurophysiology, Molecular and Cellular Exercise Physiology, Endocrinology, and Metabolism courses. In these courses students are submitted to formal presentation of the latest articles in the research fields, along with practical classes involving the effect of specific drugs and interventions.

Our undergraduate and graduate students will be prepared to work in schools, gyms, personal training and recreation. The post-graduate students will be prepared to teach and research at the university level.

Some of our post-graduation programs are now adopting published articles instead of a long dissertation at the conclusion phase of their courses. This option may help to increase the rate of published articles in our programs. Additionally, graduation students should receive more incentive for writing papers. The *International Journal of Exercise Science* presents a nice example for this option.

## RESEARCH INVESTIGATIONS

Prof. Simão: My research line is in the area of strength training and conditioning. My main focus is on researching the methodological variables of strength training, such as: exercise order, interval between sets, weekly frequency, number of sets, concurrent training (for example, strength x aerobic; strength x flexibility) and the resultant cardiovascular effects of strength training. Currently I have been opted to investigate phenomena that have practical implications and that can help the Physical Education professionals in the prescription of strength exercises and muscle hypertrophy.

For the development of such research we counted with graduation and master degree students. The graduation students initially pass by a period of one year with classes about strength training. The classes are of two hours, once a week. During that period the students earn basic knowledge and they also begin to have their first contact with scientific articles about the theme. After that, the students begin to develop simple research, with the objective of perfecting the research techniques and deepening the content, without the intention for publication. The students that distinguish themselves in this process are inserted in study groups in my laboratory. Each group is divided by investigations of interest. Since then, exists the real scientific initiation, and the first step is to write the research project for it to be approved by the Ethics Committee of the Rio de Janeiro Federal University. Once that project is approved, the research is accomplished under my direct supervision or under the supervision a master degree student. After

the end of the research, the student should be capable to develop the most difficult part of a research process, that it is the final composition and submission of the scientific article. All of the students of the group are familiarized with the laboratory and available equipment. When we do not have some necessary equipment for research, it is common to establish partnerships with other laboratories within the university, which is a very common practice in UFRJ.

The financial support to scientific research development is guaranteed by the Rio de Janeiro Federal University, by the Brazilian National Counsel of Technological and Scientific Development (CNPq) and the Foundation of Support to the Research of the Rio de Janeiro State (FAPERJ). We can have support of one or all of them at the same time, depending on the project approval by specialized commissions.

Currently I count with FAPERJ and CNPq support, besides the own University. My obligation is to give 8 class hours weekly and develop scientific research with my graduation and master degree students in the 32 remaining hours of the week. The graduation students count with financial resources of UFRJ and the master degree students can have support of UFRJ or another financial agency called CAPES (Coordination of Perfectioning of Superior Level).

The Brazilian Federal Government is responsible for these students and professors, being a public politics of development of our country. Usually the public universities of Brazil are recognized

as the best universities of the country and the ones that stimulate scientific research.

Prof. Prestes: Students of all levels may receive a monthly scholarship so they can be dedicated full time to study and the research process. However, the amounts of possibilities are limited, and several students do not have access to these opportunities.

The undergraduate and graduate students generally follow up a post-graduation student and can use part of the results as a conclusion work. The post-graduation student must work on the proposed project according to their advisors research field. For example, investigating the effects of chronic resistance training on inflammatory state in elderly women.

These students may submit their research projects to Brazilian foundation agencies. The approved projects will receive funding according to the projects needs, previously specified in the project.

The undergraduate and graduate students may present their study results in national scientific congress and national journals. Generally, post-graduation students try to publish their results in International Journals and International congress.

Our Exercise Physiology Laboratory interests are: cellular and immune responses to resistance and aerobic exercise, anaerobic threshold,  $VO_{2max}$  and exercise prescription for different populations. We also study the alterations in body composition and muscle remodeling after different types of exercise.

As already mentioned before, the areas of improvement may be directed for articles publication and the creation of more opportunities to undergraduate, graduate, and post-graduate students in the form of scholarships and founding.

### CONCLUSION

Prof. Simão: Brazil has been passing by a wide political and economical reformulation in the last 20 years. Happily we are a country with solid bases in the democracy and in wide economical development. We possessed several problems as a developing country, but slowly we should walk for a better future. The growth of a country should be based on the development of the education and in the domain of the scientific technology. Currently we have a politics of development of scientific research in all of the areas, and Physical Education should not be different. Unhappily we are still counted with a reduced number of doctors and the financial resources are still scarce, but this process is being slowly modified, and the Public Universities are the main ones responsible for that evolution. I have full certainty that the new generation of doctors in Physical Education are in agreement with these academic ideals and research objectives.