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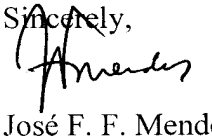
Biocomplexity Faculty Search Committee
Prof. Dr. Robert de Ruyter
Department of Physics,
727 East Third Street
Swain West 117
Indiana University
Bloomington, IN 47405-7105

Dear Professor,

Please consider my application to the open positions in your Department. My fields of research are on the areas of Soft Condensed Matter, Statistical Physics, Computational Physics and Biophysics.

Together I send my CV with list of publications, Research Plan and Teaching Goals.

Sincerely,



José F. F. Mendes

Referee Names :

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PREVIOUS ACTIVITIES AND RESEACH FOR FUTURE

IN SUMMARY, by topics:

Past:

- critical dynamics in Ising like systems;
- dynamical studies on nonequilibrium (contact processes, competing dynamics: Glauber+Kawasaki, voter models);
- epitaxial growth, surface growth;
- percolation, directed percolation;
- dynamic critical phenomena;
- granular media

Present:

- the study of principles of the organization of complex evolving networks;
- percolation on networks; stability and resilience of networks;
- cooperative phenomena in networks;
- spread of viruses within networks;
- mesoscopics in networks,
- self-organization and self-organized criticality;
- biological evolution, evolution of language;
- modeling of basic biological networks (networks of metabolic reactions, protein-protein interaction networks);
- soft-matter: critical granular flows, avalanche processes;
- deposition and growth phenomena;

Future:

Cooperative phenomena in complex evolving networks: transmittion of interactions and excitations, anomalous diffusion, complex relaxation processes, applications to Biology, methabolic networks, proteome, networks of proteins-proteins interactions, etc.

- Fluctuation phenomena in networks.
- Topology of evolving networks.
- Applications of network theory (informatics, biology, communications, econo-physics, et. al.)
- Self-organization and self-organized criticality, multiplicative stochastic processes and fat-tailed distributions.
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Other interests are related with:

- Nonequilibrium phase transitions;
- Surface Growth;
- Granular media

TEACHING GOALS

José Fernando Mendes

Whatever the mind does is done by constructing, constituting, grasping, not just by "taking in" or receiving or containing or retaining. . . . Good college teaching is the kind that promises to make the teacher finally superfluous, the kind that leads students to want to continue work in the given subject and to be able to, because they have the necessary intellectual equipment to continue to work at a more advanced level. [Each] course should be viewed not primarily as a preparation for some future course or future experience but as anend in itself. If you hope for a future that includes your subject, you must not teach to that future but to a delight in learning in the present moment.

Wayne C. Booth, *The Vocation of a Teacher*,
University of Chicago Press, 1988.

My experience consists of 15 years of teaching. I tough since then several courses, from introductory to Advanced or even graduate courses (master courses). These courses include: Introductory Physics (General course of Classical Physics – a bit more advanced than the Serway book), Thermodynamics, Statistical Physics, Waves, Advanced Statistical Mechanics, Magnetism, Computational Physics, etc.

The courses I have tough in two different Departments of Physics in Portugal (Porto and Aveiro) consist usually in theoretical and problems classes. About the theoretical classes I´m a bit conservative and all my classes are given on the black board. Time by time I used a transparent to show a picture or other not easy of reproduce on board.
Concerning to the class of problems I use to leave on the Web page of the course every week a sheet of paper with problems. Students are encouraged to think about them before class. In any case there are two possible strategies for this type of classes that depend on the course level. One consists in give enough time to students to try to solve the problems in class by themselves. After this time a student is asked to present the solution on the black board. In the other strategy, the teacher solves all problems in the black board discussing the solution with students. Both strategies have his positive and negative points. The first allow the students to think by themselves and discuss the solution. The other is more passive for the student but has the advantage that in the end he has a set of problems well solved and commented. Have a set of problems well solved and discussed can be helpful for the student. The negative point is not allow student spend some time thinking about it. But teacher can suggest other problems or leave some to be solved at home (and to be later discussed with teacher if necessary).
In any case I think students learn best by doing. And that doing can involve lesson preparation, classroom participation, research, interaction with other students, etc. I believe that students must be motivated, and provoked (if necessary) toward improve their skills. My goals, then, are to challenge students to exploit their educational opportunities to their fullest, and also to provide guidance through their academic experiences.

Usually I develop my own Class Web Pages for each course*. Readings, assignments, commentary on current events, concise tutorials on the more difficult topics, a question-and-answer forum, an archive of old exams and problems sets, links to other similar courses and similar material can be made easily available through a well-designed web site. It also has the potential to free a substantial amount of class time for applying the analytics of the course to the issues of the day. My experience with class web sites has been encouraging. I'm sure that students enjoy the class more and are willing to work harder.

* Web links of my courses in Portuguese: http://www.fc.up.pt/fis/jfmendes/ (see Teaching), http://sweet.ua.pt/~f2064/ (Statistical Physics, Física Computacional, etc)