



Exame Unificado de Pós-Graduações em Física

ATTENTION 1: We emphasize that the candidate who will do the EUF outside Brazil must appoint a supervisor, who will have to confirm the appointment within 48 hours for the registration to be completed. If the application is made by the candidate in the last two days available, the supervisor will only have until 17:00 on the day August 29, 2014 (Brazilian official time) to confirm the appointment, because that is the maximum date for the closing of all application.

ATENÇÃO 2: If technical problems are found at the registration process, the user should try first to use other internet browsers. Persisting the technical problem the user should send a message to exam_pg@ifsc.usp.br reporting the problem found.

The Unified Examination in Physics - EUF - will be used as part of the selection process for the following Brazilian universities in the 1st semester of 2015:

ITA - Instituto Tecnológico da Aeronáutica, São José dos Campos, SP
UEL - Universidade Estadual de Londrina, PR
UEPG - Universidade Estadual de Ponta Grossa, DF, Ponta Grossa, PR
UESC - Universidade Estadual de Santa Cruz, PROFISICA, Ilhéus, BA
UFABC - Universidade Federal do ABC, Santo André, SP
UFAL - Universidade Federal de Alagoas, AL
UFAM - Universidade Federal do Amazonas, AM
UFG - Universidade Federal de Goiás, GO
UFMT - Universidade Federal do Mato Grosso, Cuiabá, MT
UFPEl - Universidade Federal de Pelotas, RS
UFPB - Universidade Federal da Paraíba, DF, João Pessoa, PB
UFPR - Universidade Federal do Paraná, Curitiba, DF, PR
UFRGS - Universidade Federal do Rio Grande do Sul, RS
UFSCar - Universidade Federal de São Carlos, São Carlos, SP
UNESP - Universidade Estadual Paulista, IFT, São Paulo, SP
UNICAMP - Universidade de Campinas, IFGW, Campinas, SP
UNICSUL - Universidade Cruzeiro do Sul, SP
UNIFEI - Universidade Federal de Itajubá, MG
USP - Universidade de São Paulo, FFCLRP, Ribeirão Preto, SP
USP - Universidade de São Paulo, IFSC, São Carlos, SP
USP - Universidade de São Paulo, IFUSP, São Paulo, SP

Follows the opening call of EUF for the 1st semester of 2015, with detailed information on those responsible for its organization, disciplines relevant for the exam, and other relevant information to the candidates.

Public Notice

The Physics Graduate Program Commissions of the following institutions:

1. Instituto de Física - USP
2. Instituto de Física de São Carlos - USP
3. Instituto de Física “Gleb Wataghin” - UNICAMP
4. Instituto de Física Teórica - UNESP
5. Universidade Federal do ABC - UFABC
6. Universidade Federal de São Carlos – UFSCAR
7. Universidade Federal do Rio Grande do Sul - UFRGS

make public the opening of the application and establish the regulations for the candidates selection exam for the Master Degree and Doctorate Degree courses, for the 1st semester of 2015.

Web page of the Unified Exam: <http://www.ifsc.usp.br/~posgraduacao/inf/exameUnificado2.php>

About the registration:

1. The registration will be open from day 04 (from 09:00 - Brazilian official time) to the 29 of August 2014 (until 17:00 - Brazilian official time), and must be made online through the link: http://www.ifsc.usp.br/~posgrad/exame_pg/inscricao_euf
2. The registration for the examination does not imply that the candidate is automatically enrolled in the Graduate Programs that organize the exam. The candidate should register separately in the Graduate Institutions Program of interest. The application to the Programs of interest shall be made according to the specific rules of each institution/program within the timelines required by them. This information will be available on the pages of the Graduate Services of each institution/program.
3. The validation of the registration for the entry exam made outside Brazil must be made performed by the supervisor indicated by the interested candidate within 48 hours. Therefore, the applicant must provide a valid e-mail of the indicated supervisor displayed in the application. It is the responsibility of the candidate to contact previously with this potential mentor so that He/She is informed that it will receive a message requesting validation (acceptance) of the application. For this the potential mentor has a maximum of 48 hours to perform the validation. We emphasize that the registration process and validation has a dead line of the 08/29/14 until 17:00H (Brazilian official time). If the candidate does not receive within 48 hours the registration protocol or an e-mail stating that the indicated mentor has refused the indication it will mean that the indicated mentor has not validated the application within the 48 hours period and in that case the applicant must indicate another mentor, if there is still time for a new registration.
4. The exam application validation for the candidates who have requested the option "I want to enter another country" shall be defined until 08/22/14 (until 23:59 - Brazilian official time) when the applicant should check on its status at the registration area. In the case of indicated mentor has validated the application, but the applicant did not receive the application protocol it will mean that the requested examination place has not been made possible. In this situation the applicant must select one of the available sites, if still interest in participating in the exam. In case the proposed mentor did not validated the application, the candidate will not receive the application protocol.
5. We point out that the registration process has a deadline for the procedures described above namely: choice of location outside Brazil and validation by the indicated mentor until the 08/29/14 at 17:00H - Brazilian official time.

THE TESTS

The selection test will be held in two stages, on the **14th and 15th October of 2014**, from the 14:00 to 18:00h (Brazilian official time) at locations disclosed in the web page of the unified exam: <http://www.ifsc.usp.br/~posgraduacao/inf/exameUnificado2.php>:

For foreign examination locations, see instructions bellow.

The candidate may take the tests in an institution and enroll in the Graduate Programs in another institutions of its choice.

The organizing committee is establishing the necessary contacts to apply the test at the same time in locations properly distributed in Brazil and overseas. These locations are listed on the registration page of the EUF. The candidate should choose only one of these sites at the time of registration. It is not allowed to establish new application sites of the EUF exam, besides the sites available on the registration page, except abroad, if there are requests and exist demands that justify the request that may be placed until the **08/15/14** (until the 23h59min - Brazilian official time), when the option "I want to enter another country" will be removed from the registration page. When choosing the option "I want to enter another country", the application will not automatically consolidated. The new locations, if consolidated, will be forwarded by email to the candidate until the **08/22/14** (until the 23h59min - Brazilian official time). However, the application of the examination abroad depends on the collaboration of other institutions not directly involved with the examination, the organizing committee cannot guarantee in advance if and where it will happen. If "new locations" are not made possible until the 23h59min (Brazilian official time) of the **08/22/14**, indicating the impossibility of the official exam application at the requested location, the applicant that requested these new sites will be informed by email and should make their applications, if the candidate still has interest, choosing one of the sites available on the registration page of the EUF until the deadline date, with the indicated mentor validation, until the **17:00H of August 29 2014** (Brazilian official time).

Once enrolled in EUF, the candidate cannot change the location of the examination.

Candidates should appear at the place of the exam in possession of photo ID, pencil, pen and eraser (the use of calculators and other electronic equipment such as mobile phones, tablets, etc. will not be allowed). The exam will consist only of essay questions.

PROGRAMME OF THE EXAM

The exams will be about five general areas of Physics Undergraduate Program, namely, (1) Classical Mechanics (2) Electromagnetism (3) Modern Physics, (4) Quantum Mechanics (5) Thermodynamics and Statistical Physics. The topics of each area and recommended reading are:

1. Classical Mechanics

- a) Newton's laws.
- b) one-dimensional motion.
- c) Linear Oscillations.
- d) Motion in two and three dimensions.
- e) Newtonian gravitation.
- f) variational calculus.

- g) Equations of Lagrange and of Hamilton.
- h) Central forces.
- i) Particle Systems.
- j) Non-inertial frames.
- k) Dynamics of rigid bodies.
- l) coupled oscillations.

bibliography:

- J. B. Marion and S. T. Thornton, Classical Dynamics of Particles and Systems, 4th Edition, Harcourt, 1995.
- K. R. Symon, Mechanics, 3rd Edition, Addison-Wesley, 1971.
- T.W.B. Kibble, Classical Mechanics, Imperial College Press, 2004.
- A.P. French e M.G.Ebison, Introduction to Classical Mechanics, Chapman and Hall, 1987.
- R.A. Becker, Introduction to Theoretical Mechanics, McGraw-Hill, 1954.

2. electromagnetism

- a) the electrostatic fields in vacuum and in dielectric materials.
- b) Solution of Laplace and Poisson equations.
- c) magnetic fields, steady currents and non-magnetic materials.
- d) induced electromotive force and magnetic energy.
- e) magnetic materials.
- f) Maxwell equations.
- g) Propagation of electromagnetic waves.
- h) Reflection and Refraction.
- i) radiation.
- j) Electromagnetism and Relativity.

bibliography:

- D. J. Griffiths, Introduction to Electrodynamics, 3rd Edition, Prentice-Hall, 1981.
- J. R. Reitz, F. J. Milford, R. W. Christy, Fundamentals of Electromagnetic Theory, , 3rd Edition,1982.
- R.K. Wangsness, Electromagnetic Fields, Wiley, 1986.
- E.M. Purcell, Berkeley Physics Course, Electricity and Magnetism, Edgard Blücher,
- J.B. Marion e M.A. Heald, Classical Electromagnetic Radiation, Brooks/Cole (1995).

3. Modern Physics

- a) Fundamentals of relativity.
- b) Mechanics of relativistic particles.
- c) Propagation of light and Newtonian relativity.
- d) Experiment of Michelson and Morley.
- e) Postulates of special theory of relativity.
- f) The Lorentz transformations.
- g) Causality and Concurrency.
- h) Energy and relativistic time.
- i) Thermal radiation, the problem of the black body and the Planck postulate.
- j) photon and corpuscular properties of radiation.
- k) The Rutherford model and the problem of stability of atoms.
- l) The Bohr model.

- m) Boltzmann distribution of energy.
- n) Atoms, Molecules and Solids.

bibliography:

- R. Eisberg and R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles 2nd Edition, Wiley, 1985.
- Tipler e R.A. Llewellyn, Modern Physics. 3rd Edition, LTC, 2003.
- W. Rindler, Introduction to Special Relativity, Oxford Univ. Press, 1991.
- A.P. French, Special Relativity, W.W. Norton (1968).
- S.T. Thornton e A. Rex , Modern Physics for scientists and engineers, Brooks Cole, 2005.
- R.A. Serway, C.J. Moses e C.A. Moyer, Modern Physics, Brooks Cole, 2004.
- J. Leite Lopes, Introdução à Teoria Atômica da Matéria, Ao Livro Técnico, 1959.
- H.M. Nussensveig, Curso de Física Básica IV, (chapter 6), Edgard Blücher.

4. Quantum Mechanics

- a) Introduction to the fundamental ideas of quantum theory.
- b) The mathematical apparatus of quantum mechanics of Schrödinger.
- c) formalization of Quantum Mechanics. Postulates. Description Heisenberg.
- d) The one-dimensional harmonic oscillator.
- e) One-dimensional potentials.
- f) The Schrödinger equation in three dimensions. Angular momentum.
- g) Central forces and the Hydrogen atom.
- h) spinors in non-relativistic quantum theory.
- i) Addition of angular momenta.
- j) Theory of disturbance independent of time.
- k) identical particles.

bibliography:

- C. Cohen-Tannoudji, B. Diu, F. Laloë, Quantum Mechanics, Vols. I and II, 1st Edition, Wiley, 1977.
- S. Gasiorowicz, Física Quântica. Guanabara Dois, 1979.
- E. Merzbacher, Quantum Mechanics 3rd Edition, Wiley 1997.
- R.H. Dicke e J.P. Wittke, Introduction to Quantum Mechanics, Addison Wesley, 1961.
- Levin, Quantum Chemistry, Prentice-Hall, 1991.

5. Thermodynamics and Statistical Physics

- a) thermodynamic systems.
- b) Variables and equations of state, PVT diagrams.
- c) Labor and first law of thermodynamics.
- d) mechanical equivalent of heat.
- e) Internal energy, enthalpy, Carnot cycle.
- f) Phase changes.
- g) Second law of thermodynamics and entropy.
- h) thermodynamic functions.
- i) Practical Applications of Thermodynamics.
- j) Kinetic theory of gases
- k) Physical Description of a Statistical System.
- l) microcanonical ensemble.

- m) Canonical Ensemble.
- n) Canonical Formalism in Classical Gas.
- o) Grand Canonical Ensemble.
- p) Ideal Quantum Gas.
- q) Ideal Fermi Gas.
- r) Bose-Einstein.

bibliography:

- S.R.A. Salinas - Introdução à Física Estatística . Edusp, 1998.
- F. Reif. Fundamentals of Statistical and Thermal Physics. 1st edition. Mc Graw Hill, 1965.
- F. W. Sears and G. L. Salinger. Thermodynamics, Kinetic Theory, and Statistical Thermodynamics , 3rd Edition. Addison Wesley.1975.
- H.B. Callen, Thermodynamics ,Wiley, 1960
- R. Kubo, Statistical Mechanics, North-Holland, 1965
- M. W. Zemansky - Calor e Termodinâmica, Ed. Guanabara Dois, 1978.

GRADING OF EXAMS AND THE DISSEMINATION OF THE RESULTS

The exams will be graded and a final score of 0 to 10 will be assigned, with an accuracy up to the second decimal place, to each candidate reflecting its performance in the exam. The seven Graduate Course Commissions involved in the organization of the exam will have access to all the grades, but the same shall not be published *in totum*. Each candidate will receive by post or email to the addresses indicated in the registration form, its final exam score and the quartile in which their grade, in each of the five subjects, was classified.

The deadline for the release of the final scores of the examination for the candidates and the Graduate Programs Coordinators will be **November 25th, 2014**.

The tests will be discarded 2 months after publication of the results.

THE USE OF RESULTS

Each of the Graduate Program will use the results of the examination for the selection and ranking of candidates, according to their own criteria. Acceptance or non-acceptance into a program does not imply acceptance or non-acceptance in another program.

THE APPLICATION OF THE EXAM

1. The applicant should appear at the place of examination in both days at least 30 minutes prior to the start of the exam for checking documents and signing the attendance list, fitted with a valid photo ID;
2. The tests can be done in pencil or blue or black ink pen;
3. Each stage of the examination will last for four (04) hours beginning at 14h (Brazilian official time);
4. It will not be allowed to query any materials except that contained in the exam material.
5. The use of calculators and/or other electronic equipment such as mobile phones and schedulers will not be allowed.
6. It is not allowed entrance to the examination room after 60 minutes of the start of the tests;
7. Definitive exit of the exam room will be allowed only after 60 minutes from the start of the examination;

8. The candidate can go to the bathroom, only after 60 minutes from the start of each exam and accompaniment by one of the exam supervisors;
9. The draft pages used in the exam will not be considered in the grading, only the information entered in the appropriate answer pages;

ADDITIONAL INFORMATION:

Graduate Office of: IFSC-USP

Web page: <http://www.ifsc.usp.br/~posgraduacao>

Av. Trabalhador São-carlense, 400 - Centro - 13566-590 - São Carlos, SP, Brazil

POBox 369,

ZIP Code: 13560-970, São Carlos, SP

e-mail: exam_pg@ifsc.usp.br

Telephone: +55(16) 3373-9777/ 3373-8808

Graduate Office of: Instituto de Física “Gleb Wataghin” da Unicamp, IFGW/UNICAMP

Web page: www.ifi.unicamp.br

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