An International PhD program in Numerical Simulation at CEA

GUIDE FOR APPLICANTS

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1. What?

The NUMERICS PhD program is an international mobility program for students who desire to undertake a 3-year PhD project in the fields of numerical simulation and scientific computing in a CEA laboratory. This program will be operating during the period 2018-2023 and is co-funded by the European Commission and the French Atomic Energy and Alternative Energies Commission (CEA).

2. Why?

The NUMERICS PhD program is a real opportunity to get an international experience. As for other PhD programs at CEA, the main goal is to develop PhD students' competencies, creativity and professionalism on an international scale.

The NUMERICS PhD program promotes cutting-edge research in diverse scientific domains with real prospects that build up an innovative PhD training focused on numerical simulation and scientific computing as transversal research activities. The NUMERICS program relies on internal structures (e.g. Maison de la Simulation, TGCC) that act as stimulating base campuses for PhD students, especially in terms of research, training, expertise sharing, mutual exchanges. This project will propose 50 international fellowships in three selection sessions all along the program duration. The program also aims at further stimulating the development of European research and human resource capacities, knowledge transfer between academic institutions and industrial stakeholders and thus strengthen the competitiveness and innovation of EU industries in this area. Training NUMERICS PhDs to the high standard set out in the program will ultimately lead to producing a new generation of researchers able to answer the current societal challenges.

3. Who?

Applicants must meet the conditions set up by the Marie Skłodowska-Curie actions from the European Commission (see below **Eligibility Requirements**). NUMERICS PhD fellows are selected after three selection sessions organized in 2018, 2019 and 2020. The results of the selection are published in June. Selected PhD students will be registered in a French Doctoral School in a partnership with CEA. The fellowship consists of a 3-year work contract governed by French law that covers the duration of the PhD project. The work contract will be drawn up by CEA, ensuring that the social charges are paid, and entitling fellows to health insurance and CEA top up health insurance, social equity, and retirement, plus supplemental retirement. NUMERICS fellows can generally start their PhD in October.

4. When?

The schedule for both 2019 and 2020 selection sessions is the following:

- Publication of the PhD projects selected by CEA for the NUMERICS program on the website www.numerics.cea.fr/ . Launch of the call: February 2019 / 2020.

- **Deadline for applications: 30 April 2019 / 2020;**
- Shortlisting of applications by the NUMERICS Selection Committee;
- **Interviews with the candidates: June 2019 / 2020.**
- Publication of results: July 2019 / 2020
- Start of PhD: October 2019 / 2020

5. How long?

The NUMERICS PhD program lasts 5 years, from October 1, 2018 to September 30, 2023 and will be financed by the European Commission and CEA during that period. NUMERICS PhD fellows will be supported by a 3-year PhD work contract that must fit during this 5-year period. By exception, and when duly justified by the host laboratory at CEA and the Doctoral School, the PhD work contract may be extended for a few months period in order to complete the PhD project. The extension will be automatic when the fellows had to stop their research due to sickness or maternity leave.

6. Which research fields?

CEA laboratories are spread over 10 research campuses in France which operate cutting-edge research in diverse scientific and technological fields related to low-carbon energies, information and health technologies, and the development and operation of very large-scale technological facilities. The NUMERICS Scientific Committee will select each year a number of PhD projects from all the disciplines covered by its laboratories and having a high component of research activity in numerical simulation and scientific computing. Covered scientific disciplines include solid-state physics, chemistry and nanoscience, material sciences, high-energy physics and physics of the universe, environmental sciences, theoretical physics, and life sciences.

Before publication, all the PhD projects proposed by CEA are checked by CEA internal Ethics Committees to fully meet the fundamental ethical principles and requirements as indicated by the European Commission, especially for research in the fields of life sciences and nanotechnologies.

Applicants may apply to more than one PhD project, however they will be asked to indicate their priority at the time of selection.

II. Eligibility requirements

To join the Numerics PhD program, potential applicants must meet a number of eligibility requirements such as mobility conditions and compliance with the required level of experience. The compliance with these requirements will be checked based on the information given by the applicant in the Application Form. Applications that do not meet these eligibility requirements will not undergo further evaluation and will be rejected. If, at a later stage, a requirement turns out not to be met (due e.g. to incorrect or misleading information in the Application Form or because the applicant has not been awarded his or her Master's degree), the application will be immediately rejected.

The compulsory eligibility requirements are the following:

- **geographical mobility**: applicants must not have resided or carried out their main activity in France more than 12 months over the three years before the call deadline (deadline for applications). Compulsory national service and/or short stays such as holidays are not taken into account.
- **academic level**: applicants must hold or be enrolled in a Master's degree program.

Selected applicants are considered NUMERICS fellows once they have signed their work contract. NUMERICS fellows can be of any nationalities. They must hold a Master's degree before starting the program.

III. Application requirements – How to apply

Potential applicants are required to:

- read carefully the present Guide for Applicants.

- verify that they meet the geographical mobility condition and the academic level conditions specified in the **Eligibility Requirements** section.

- choose one or more NUMERICS PhD subjects from the list provided on the website www.numerics.cea.fr. To obtain more information concerning a PhD project, potential applicants may contact the PhD supervisor whose contact details are given on the page with the description of the PhD project.

- download the Application Form from the website www.numerics.cea.fr/.

- fill in the Application Form with their entire curriculum and all their University results.

- send the duly filled Application Form in PDF format by email to numerics@cea.fr, accompanied by:

- a detailed CV (max. 2 pages),
- a cover letter presenting their application with respect to the particular PhD project(s) they chose,
- copies of academic records in the different exams passed at University,
- any additional document showing achievements during academic and private training, especially during internships in academic and/or industrial laboratories,
- a copy of the administrative pages of the passport.

In the Application Form, applicants are asked to provide the names and email addresses of two scientists that can be contacted by NUMERICS at a later stage to provide a letter of recommendation.

Applicants are urged to write a cover letter that explains the particular interest they have in the PhD project(s) they apply to and how their previous achievements can be related to the PhD project(s) they apply to, their motivation to enroll in a PhD program, and how they envision their professional project after their PhD thesis.

IV. Application and selection processes

The Application and Selection processes for the NUMERICS program are organized in 6 successive phases:

1. Application phase: applicants send an Application Form with the required accompanying documents as per Section III **Application requirements – How to apply** before the Call deadline. The Call deadline is 30 April 2019 for the 2019 Session, and 30 April 2020 for the 2020 Selection Session.
2. Evaluation of Applications – Step 1: the NUMERICS Evaluation Committee registers the Application Forms, verifies the eligibility of the applicants and selects, for each proposed PhD subject, the best 2-3 eligible applications for further evaluation. All applicants are informed of the results of the evaluation.
3. Interviews with Candidates: Applicants whose application has been selected following Step 1 are invited to an interview with the NUMERICS Selection Committee. The interview is organized in June in a remote mode, but applicants have the possibility to be physically present if they wish to. The interview is based on a presentation made by the applicant (15 min. max) and that is followed by questions from NUMERICS Selection Committee scientists.
4. Evaluation of Applications – Step 2: the Selection Committee ranks the candidates (with the PhD project he/she applies to) by order of merit. The final list of awardees is based on the merit of the applicants and the number of fellowships available (20 for 2019, 25 for 2020). A waiting list is established if the non-selected applications are valuable.
5. Publication of the results: Applicants whose application has been selected are informed by mail. The list of selected applications is published on the NUMERICS website www.numerics.cea.fr/ in July.
6. Recruitment phase: the CEA HR Division provides the applicants with all information concerning the recruitment procedure by CEA to the applicants. NUMERICS Fellows can normally sign their work contract and start their PhD project on October 1st , but this date may be adjusted upon request from the laboratory or the candidate.

V. Review criteria for the assessment of applications

The evaluation of applications to the NUMERICS PhD program is performed in a two-step manner. The first step is the evaluation performed by the NUMERICS Evaluation Committee based on the Application Forms received from the applicants, with the additional documents sent by the candidate, and the letters of recommendations received. The Evaluation Committee verifies the eligibility of the application (see above **Eligibility Requirements**) and selects, for each PhD subject open for application and listed on the website, at most 2-3 applications. The selection is made using the following criteria:

Criteria	Evaluation	Relative weight for ranking
Education and	• Academic records in the different exams passed at University,	60%

qualification	• Fame of this University as judged by international ranking, • Adequacy of training (types and contents of courses attended and results obtained by the applicant) with respect to the chosen subject and training recommended by the supervisor as reported in the description of the subject published in the website), • Number of years needed to obtain the University degrees (taking into account special leaves for maternity, sickness or breaks for other activities).	
Professional experience	• Achievements during academic and private training, especially during internships in academic and/or industrial laboratories, • Other achievements that may show the capacity of the applicant in successfully undertaking new work/actions with sufficient autonomy and initiative, • International and cross-domain experience.	30%
Others	• Volunteering or community service, personal commitments, • Languages (notably ability to speak, read and understand English in a scientific environment), • Perspectives for openness, intellectual curiosity and creativity, notably contributing to the international, inter-sectorial, interdisciplinary nature of the program, • Ability to make sound judgements and leadership qualities, • Ability to put their PhD training in perspective with their future career, • Motivation for international mobility.	10%

Applicants selected after this first step are invited to an interview with the NUMERICS Selection Committee, which makes the final selection. The interview is planned in June and is made remotely.

For the interview, applicants are asked to prepare a short presentation (15 minutes maximum) that focus on their achievements during academic and training including scientific internships, their understanding of the PhD project(s) they apply to. Applicants are strongly suggested to respect the following scheme for their PowerPoint presentation:

- Presentation of themselves: 1 slide;
- Presentation of the work performed during the Master's internship (or any other relevant scientific work): 1 slide;
- Presentation of the PhD project: problematics and tentative schedule: 1 slide;
- A fourth slide, at the choice of the applicant.

The 15-min presentation will be followed by questions from the members of the Selection Committee. The NUMERICS Selection Committee will use the following criteria to perform the final selection:

Criteria	Relative weight for ranking

• Applicant's profile based on Selection Step 1.	30%
• Motivation and professional project.	30%
• Interview: evaluation of the applicant.	40%

For each application, a 10 point scale grade is given to each criterion. Applications with a final grade above 7 out of 10 are considered for the final ranking.

The Selection Committee ranks the candidates, with the PhD project they apply to. If a selected candidate applies to several PhD project at once, he/she will be asked to give his/her preference. The Selection Committee established the final list of awardees with the corresponding PhD projects, which is also published on the website in July. A waiting list is also established for non-selected applications passing the threshold of 7/10.

VI. Employment conditions – Special benefits

1. General – Work environment

NUMERICS PhD program fellows will have a 3-year fixed-term contract specific for PhD students at CEA, whose contractual conditions are compatible with the rules defined by the European Commission and the French employment law. The monthly gross salary amounts to **€2,043.54 in years 1 and 2, and to €2,104.62 in year 3**. The fellows will also be entitled to profit sharing bonus for years 2 and 3, and to the patent bonus if their work leads to patent application by CEA.

NUMERICS fellows will be hosted in a CEA laboratory where the best will be done for a secure and dynamic research work environment. Under the supervision of a senior scientist, NUMERICS fellows will contribute to the dissemination of their results by participating to scientific workshops and (international) conferences, the costs of which will be supported by the CEA host laboratory.

2. Social and fringe benefits

NUMERICS fellows mostly have the same rights and duties than permanent workers at CEA. Please find below a list of social and fringe benefits that NUMERICS fellows are entitled to:

- Legal work time, paid holidays and 10 days of public holidays.
- Maternity, sick and accident leave. NUMERICS fellows have the same social advantages than CEA employees in terms of contribution to parental leave, health and accident insurance.
- Permanent professional training. CEA has significant strategic plans for the life-long training of its employees, including NUMERICS PhD fellows. See the below for additional specific information regarding NUMERICS fellows.
- Retirement. Like permanent researchers, NUMERICS fellows benefit from pension fund and contribute to a retirement pension scheme.
- NUMERICS fellows are considered permanent staff regarding social benefits such as access to catering and company transportations. Lunches onsite are partially supported by CEA. CEA's contribution depends on the

- personal income. Free transportation by company buses is organized from many places surrounding CEA campuses. People that happen to live far from those pick-up places are entitled to a partial financial participation to cover public transportation fees.
- NUMERICS PhD fellows have access to the library and social activities such as musical, cultural and sport activities. Benefit from discount holidays travels and theatre, opera and movie tickets.
- In most cases, and like all international scientists routinely welcomed by CEA, NUMERICS fellows will be helped by associations co-funded by CEA to find housing and school for children, fulfil administrative forms, and open a bank account. The following website contain information that can be useful for fellows working on the campuses located in the Parisian Region: internationaloffice.ceasaclay.com/?lang=eng . The following guide also contains useful information for international students coming to France: www.universite-paris-saclay.fr/en/guide-daccueil-des-etudiants-internationaux
- Like all CEA employees, NUMERICS fellows are required to a complete a Security Background Investigation. In total respect with the national law, CEA conducts a medical examination and a background investigation before any employment. Fellows are required to answer personal questions about themselves and their family such as place and date of birth, employment, and address. This information is necessary for CEA to allow access and work in CEA premises and facilities.

3. Mentoring sessions - Career development

The '*Maison de la Simulation*' www.maisondelasimulation.fr/en/index.php on the Saclay campus, the '*Centre de Simulation Prédictive*' on the Grenoble campus with Minatec www.minatec.org/en/ribbon-cut-on-predictive-simulation-center/ will inform NUMERICS PhD fellows about their specific resources and associated training programs, which are published on their websites. NUMERICS fellows will be invited to seminars regularly organized by these institutes and in turn may be asked to put in a nutshell the problematics of their work and their results/orientations in a max 10-minute presentation for all young scientists and supervisors, also including interns and postdoctoral fellows.

NUMERICS fellows will also benefit from a specific training program organized by the CEA training institute, INSTN.

Within the first months of their stay, fellows will be invited to join a training session entitled '*Build your thesis and your career plan*". This specific training aims to help young researchers to carry out their research project in the best possible conditions:

- become aware of the excellence and scarcity of their skills and how to value them;
- build their thesis as a project manager;
- clarify their career plans using methods that highlight their motivations, skills and abilities;
- change their representations on the employment market in order to eventually widen their future recruitment possibilities.

In addition, the following is a list of specific training sessions organized by INSTN at CEA and aiming at strengthening transverse professional skills of PhD students. NUMERICS PhD fellows will have the possibility to attend them upon request:

- "**Ethics in research and academic integrity**" (1 day) aims at providing 1st year PhD students with the highest standards of ethics and integrity in the conduct of their research (partnership with Doctoral School).
- "**Efficient use of scientific and technical information (STI) tools to optimise your PhD work**" (1 day) aims at helping the PhD students to start their PhD work efficiently, by making them acquire the methods and tools for accessing scientific information quickly and efficiently.
- "**Leading a scientific project**" (3 days) is recommended for 2nd year PhD students and aims at helping them to acquire methods and tools for managing a scientific project, so that they can optimize their research and strengthen skills that are necessary to work in the industry.
- "**Introduction to the business world**" (3 days), also for 2nd year PhD students aims at helping them to learn about the business world, to understand business strategies, organisational structures, norms and rules, and vocabulary. The course aims at facilitating exchanges and future collaborations with the business world.
- "**Technology transfer and innovation in the industry**" (3 days) helps 2nd year-PhD students to participate in innovative projects in the public and private sector. The course aims at: (1) making them acquire the methods and tools necessary for technical economical diagnosis of innovative projects and (2) letting them experiment with technology transfer and business development tools.
- "**Include IP processes in the research activity**" (1 day) aims at giving PhD students practical clues to understand patents, their role, and how they are included in the R&D activity (partnership with CEA/Valo Division).
- "**Prepare for successful jobs interviews**" (3 days) for 3rd year PhD students; aims at helping them to clarify their career project and thereby prepare for an interview.
- "**Write your dissertation efficiently**" (3 days) helps them acquire a methodology for writing their dissertation.
- "**Prepare your PhD oral presentation efficiently**" (2 days) helps them to prepare for their final dissertation oral presentation.
- "**Set up a H2020 project – collaborative or ERC –** (3 days) on how to successfully exploit H2020 Research and Innovation Programme with winning proposals.

A French course is also systematically proposed by CEA to non-French speaking CEA employees, including PhD students.