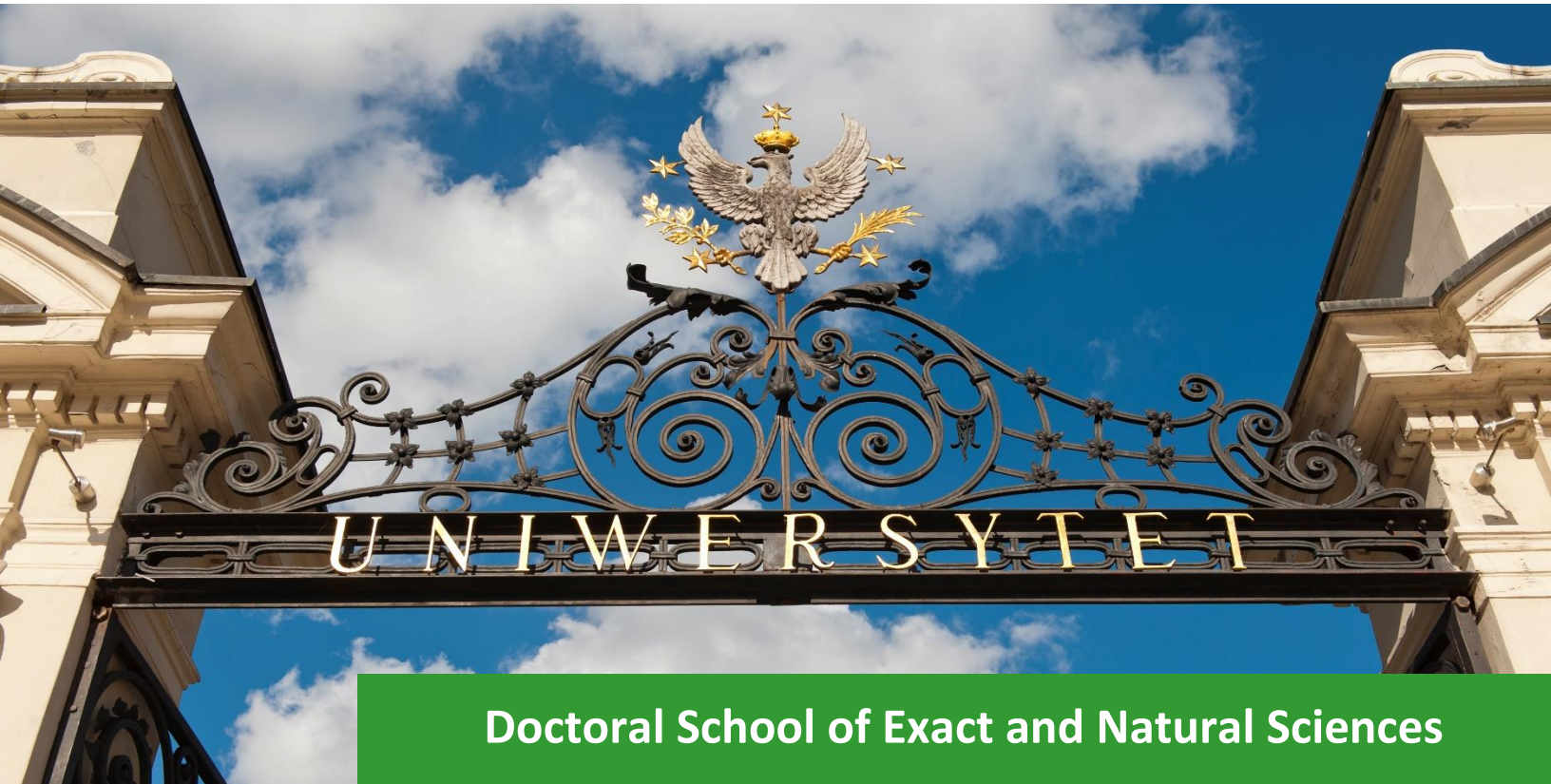


A GUIDE FOR THE CANDIDATES

RECRUITMENT 2022/2023



Doctoral School of Exact and Natural Sciences

Biological Sciences



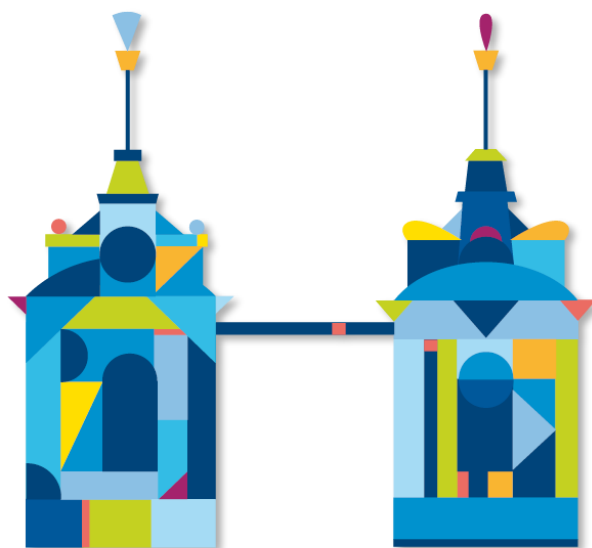
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Recruitment Legislation and Acts to Know

- Resolution no. 17 of the Senate of the University of Warsaw of 20 January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2021, item 142).
- Ordinance no. 12 of the Rector of the University of Warsaw of 27 January 2022 on the establishment of an admissions schedule and rules for registering candidates to doctoral schools in the academic year 2022/2023 (the University of Warsaw Monitor of 2022, item 26).
- Resolution no. 3 of the Rector of the University of Warsaw of 27 January 2022 on the admission procedure fee for carrying out the qualification procedure to the doctoral school at the University of Warsaw (the University of Warsaw Monitor of 2022, item 27).



About the School

The main element of education at the Doctoral School of Exact and Natural Sciences (SDNSP) is the implementation of an individual PhD project in one of the scientific disciplines (Astronomy, Computer Science, Mathematics, Biological Sciences, Chemical Sciences, Physical Sciences, Earth and Environmental Sciences) that are covered by the school, under supervision of a faculty member chosen by the doctoral student.

The education at SDNSP lasts 4 years and includes courses in the form of specialization and monographic lectures, workshops, seminars, two-day symposiums as well as courses and trainings to improve the skills of doctoral students in teaching.

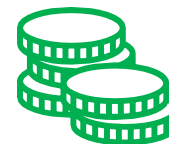
The graduate of the Doctoral School of Exact and Natural Sciences has a highly specialized education acquired under the supervision of leading scientists and is prepared to undertake independent scientific and teaching activities at universities and research institutes. In addition, the graduate gains extensive knowledge beyond the discipline in which he/she prepares his/her doctoral dissertation, as well as skills in conducting scientific and teaching activities.

Academic disciplines under the admission procedure and the limit of places:

- astronomy – limit of **5** places
- mathematics and computer sciences – limit of **22** places
- biological sciences – limit of **17** places
- chemical sciences – limit of **18** places
- physical sciences – limit of **27** places
- Earth and related environmental sciences – limit of **11** places

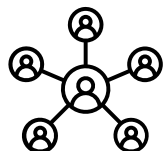
Scholarship

In accordance with Art. 209 of the act of 20 July 2018 – The Law on Higher Education and Science, a doctoral student who does not hold a degree of doctor shall receive a doctoral scholarship. The total period of receiving the doctoral scholarship at doctoral schools shall not exceed 4 years. The amount of a monthly doctoral scholarship shall be at least: 37% of a professor's salary – up to the month in which the mid-term evaluation was conducted; 57% of a professor's salary – after the month in which the mid-term evaluation was conducted. The amount of the minimum basic salary of a professor is currently PLN 6,410 gross. The above-mentioned amounts may change if the Ministry responsible for higher education and science decides to announce a new base professor's salary. During the four years of study, each PhD student receives a scholarship in the amount of PLN 2371.70 (gross) for the first two years of studies (before the mid-term evaluation) and PLN 3653.70 (gross) in the next two years after the mid-term evaluation. Supplement for people with disabilities: PLN 711.51. The scholarship is reduced by 11% due to compulsory deducted toward social security.



Supervisor

It is worth starting the recruitment process to a doctoral school at the University of Warsaw by finding a supervisor, who are willing to provide care for the doctoral student and perform scientific supervision over their research project. In order to find a supervisor, candidates for the Doctoral Schools are encouraged to search through the database of supervisors. The database contains the list of University of Warsaw researchers, who are willing to perform the function of the dissertation supervisor.



<https://promotorzy.szukolodoktorskie.uw.edu.pl/en/search>

Please note that not all potential supervisors are on the list. The candidates are also encouraged to consult the websites of the University of Warsaw faculties and academic units for the information on academic teachers conducting their research.



<https://en.uw.edu.pl/about-university/faculties/>

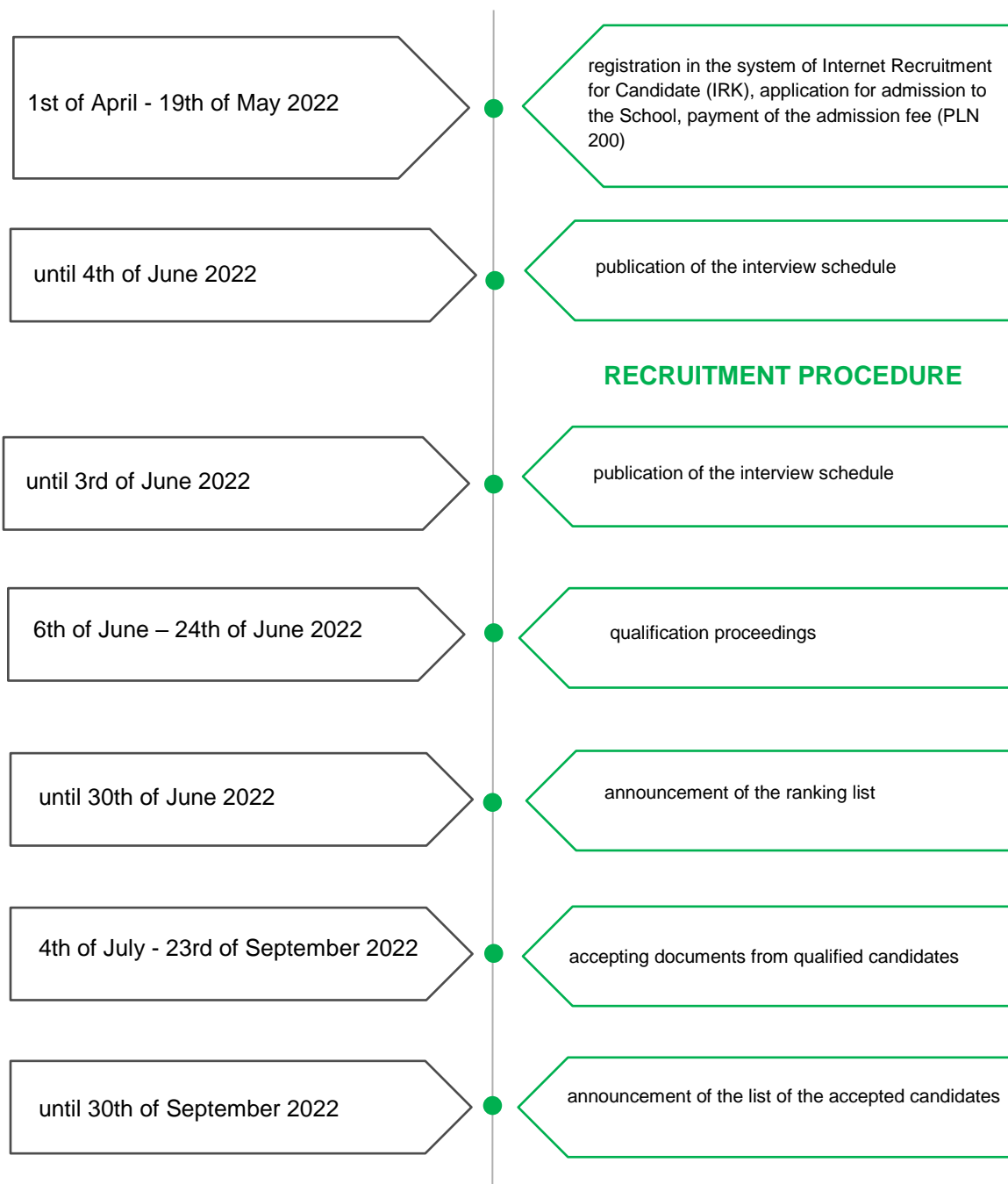
According to the School Regulations, a potential supervisor can only be a person with:

- the habilitated doctor (doktor habilitowany) degree or an equivalent degree or the title of professor as well as has to be an employee of the University of Warsaw or the employee of the institution co-running the School (Institute of Mathematics Polish Academy of Sciences);
- the status of retired professor at the University of Warsaw.

The dissertation supervisor can be a person, who remains a dissertation supervisor for no more than five doctoral students or persons applying for being awarded the doctor degree (e.g. participants of doctoral studies who have initiated a doctoral dissertation process). In exceptional instances, the Director of School may increase this limit.



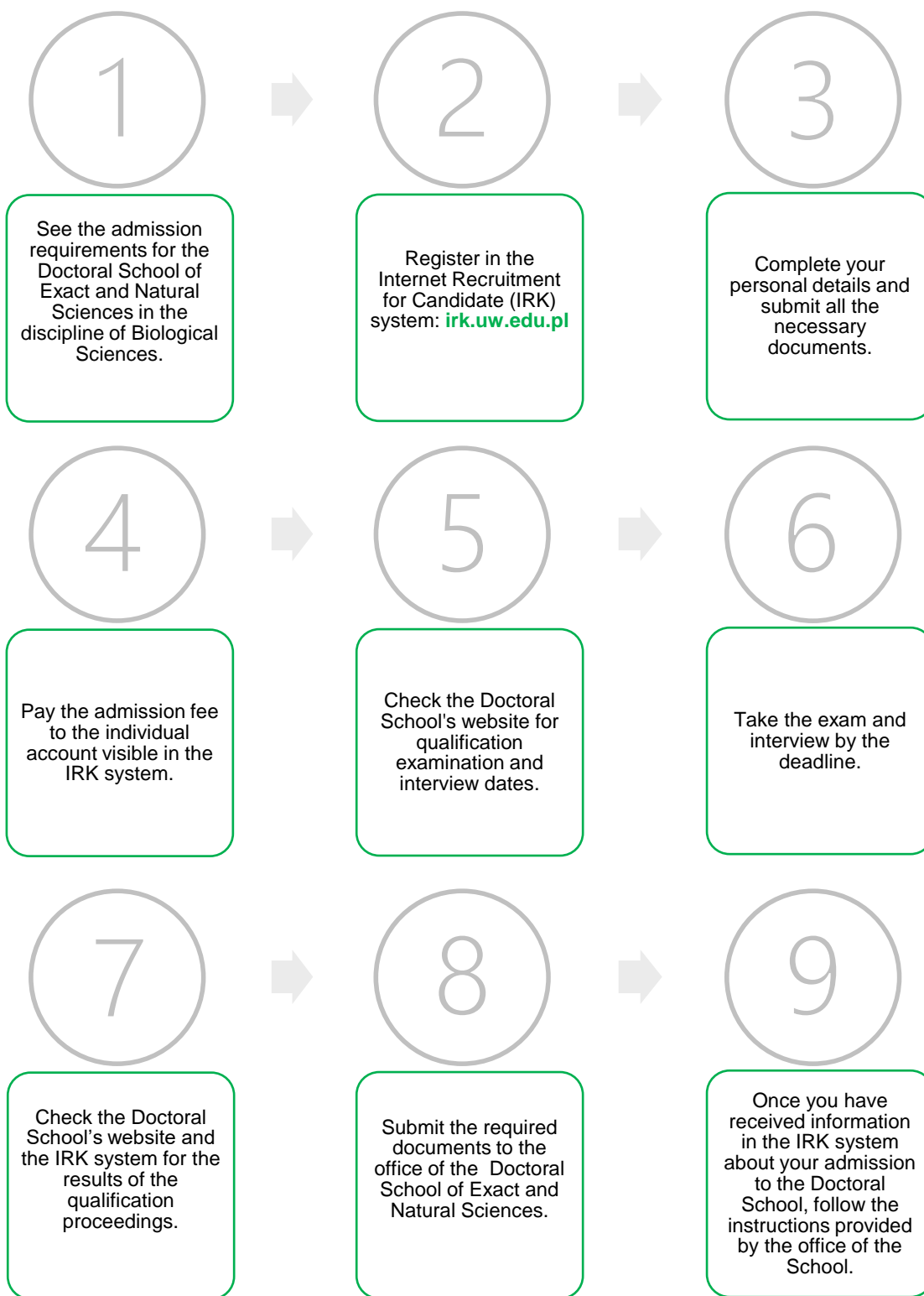
Recruitment schedule



Beginning of education – October, 2022



How to apply?



Required documents

The candidate shall submit a School admission application only through the IRK. The application shall include the following:

- 1) indication of the selected discipline in which the candidate plans to pursue education or in the case of applying for the Interdisciplinary Doctoral School – fields of science with the specification of the leading field (and where there is no leading field – at least two equivalent disciplines), PESEL number or passport number, nationality, contact information (residence address, e-mail address, telephone number), information whether the candidate agrees to receive administrative decisions by means of electronic communication, consent for processing of personal data for the purposes of the admissions procedure;
- 2) documents:
 - (applies to candidates holding a Master's degree or an equivalent degree obtained under separate regulations or, in accordance with their declaration, who shall hold such a degree by 23 September 2022) a scan of the graduation diploma of uniform master's degree or postgraduate studies or an equivalent diploma obtained under separate regulations, or in the case of candidates pursuing education in the European Higher Education Area – a certificate of holding a master's degree or a statement that the diploma or certificate confirming the award of a master's degree will be delivered by 23rd of September 2022, in the case of a diploma equivalent to a uniform master's degree or postgraduate studies graduation diploma, a candidate shall justify such equivalence. In case the diploma was issued in a language other than Polish or English, the candidate shall attach its certified translation;
 - (applies to candidates who are research project coordinators for a project carried out at the University as part of the “Diamentowy Grant” [Diamond Grant] program launched by the Minister responsible for higher education and science or submitted an application as part of this program that is currently pending review) the candidate shall submit a statement that he/she is funded a grant by the Minister responsible for higher education and science under the “Diamentowy Grant” [Diamond Grant] program or a statement that an application has been submitted as part of the “Diamentowy Grant” [Diamond Grant] program, providing the title of the candidate's project;
 - (applies to candidates who are a graduate of a first degree program or a students who have completed the third year of a unified master degree program, and have been approved by the Director in consultation with the qualification team to be considered for admission due to their exceptional, superior scientific achievements demonstrated so far) the candidate shall attach the Director's consent.
- 3) a description of the initial research project proposal in English; The description may not exceed four pages, font type: Times New Roman or equivalent, font size: at least 11 points, line spacing: 1, upper and lower margin: at least 1.5 cm, side margins: at least 2 cm, the references shall be include in the page limit;
- 4) a resume or CV outlining the candidate's scientific activity, including scholarly interests and achievements during the five calendar years preceding the application (if a candidate became a parent during this time, as evidenced by a scan of the child's birth certificate attached to the application, this period shall be extended by two years for each child), including, but not limited to:
 - publications,
 - research and organizational work at student research groups,

- participation in scientific conferences,
 - participation in research projects,
 - awards and honorable mentions,
 - research internships,
 - research skills training programs completed,
 - activities promoting science,
 - activity in science movement representative bodies,
 - average of their university grades,
 - professional career,
 - level of proficiency in foreign languages;
- 5) scans of materials evidencing scientific activity mentioned in their CV and/or resume;
 - 6) a document confirming at least B2 proficiency level in English or a declaration of the level of proficiency in English allowing education at the School;
 - 7) the scan of a declaration by the planned supervisor, confirming their agreement to undertake the duties of a supervisor and of the number of doctoral students, for whom they perform the duties a designated supervisor, in accordance with the template constituting Appendix no.4 to the Resolution no. 17 of the Senate of the University of Warsaw of 20th January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2021, item 142), the candidate may also attach a scan of their planned supervisor's opinion and opinions of other academics about the candidate and their scientific activity and/or proposed research project;
 - 8) the photograph of a candidate's face that allows for their identification;
 - 9) a declaration confirming whether the candidate was or is a doctoral student or a participant of doctoral studies or whether they have initiated a doctoral dissertation process or whether proceedings to award them a doctoral degree have been initiated – and if yes, the title of their doctoral dissertation or the research project prepared by a candidate, including the name and last name of the candidate's tutor or supervisor;
 - 10) a declaration confirming that they have reviewed the Resolution no. 17 of the Senate of the University of Warsaw of 20 January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2021, item 142) and Articles 40 and 41 of the Code of Administrative Procedure;
 - 11) contact data of two persons who will send recommendation letters regarding the candidate directly to the address sd.nsp.biol@uw.edu.pl, which is specific for a given disciplines. It is the candidate's responsibility to ensure that the person who makes the recommendation sends the letter. A failure of receiving the recommendation letters does not mean that the application for admission to the School is incomplete; the letters may be taken into consideration when evaluating the candidate's scientific potential;
 - 12) scanned transcripts of records of the graduate and postgraduate studies or the uniform Master's degree studies, or equivalent documents (e.g. diploma supplement);
 - 13) abstract of the master's thesis or master's project in English (up to 3,000 characters with spaces).

Admission fee

The admission fee is **PLN 200** and is paid to the candidate's individual account generated in the IRK system.



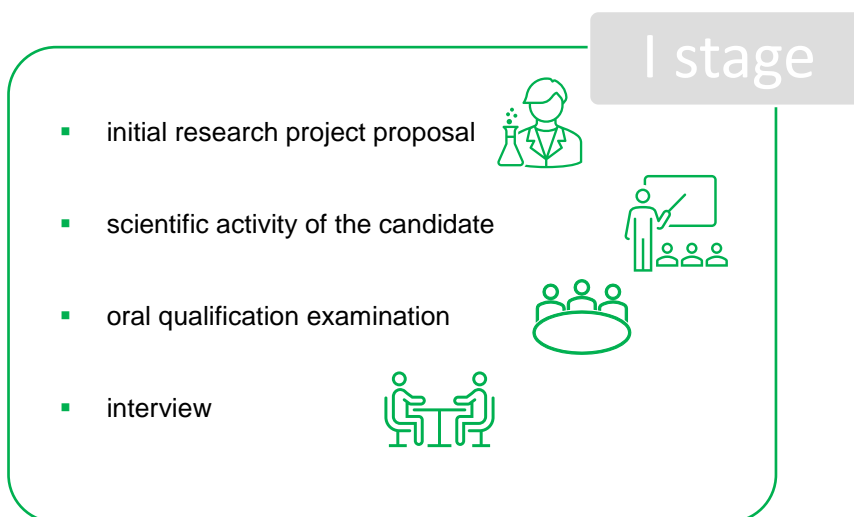
Instruction for completing the application for admission to the SDNSP



In order to complete the application for admission to the Doctoral School of Exact and Natural Sciences correctly, there have been the instructions published on the School's website, which may be helpful when registering in the **Internet Recruitment of Candidates (IRK)** system.

Form of qualification proceedings

One-stage proceedings



Number of points to be awarded

The maximum number of points to be obtained in the qualification proceedings:

100 points



Language of qualification proceedings

The interview shall be held in Polish or English, according to candidate's preferences indicated in the IRK. If Polish is selected, a part of the interview may be held in English.



Assessment criteria and methods

Initial research project proposal (maximum number of points – 5)

When evaluating the initial research project proposal, the following shall be taken into account:

- 1) the feasibility of the project in the context of documented competencies of the candidate;
- 2) the academic importance of the project;
- 3) anticipated added value for the scientific community of the academic discipline

Scientific activity of the candidate (maximum number of points – 15)

When evaluating scientific activity, the following elements, confirmed by means of scanned documents, shall be taken into account:

- 1) scientific publications (a scan of the front page is required; in the case of multi-author achievements, the percentage share of the candidate's participation in the achievement must be defined)
- 2) confirmed participation in student competitions;
- 3) confirmed participation in research projects (a scan of the certificate issued by the project coordinator is required);
- 4) presentations delivered or seminar and conference messages (a scan confirming presentation delivery is required);
- 5) documented research internships;
- 6) achievements within students' research groups (a scan of the certificate signed by the chairperson of the group is required).

Qualification examination (maximum number of points – 40)

Verifying the candidate's knowledge and skills within the particular academic discipline in oral form.

Interview (maximum number of points – 40)

The interview entails an assessment of the candidate's scientific potential. The interview may comprise the following elements:

- 1) discussion of the candidate's Master's thesis (understanding of the subject, research hypotheses, their implementation, results obtained and conclusions);
- 2) questions about the academic record and the course of the graduate and postgraduate studies or the uniform Master's degree studies, including subjects related to the doctoral dissertation;
- 3) questions pertaining to information included in letters of recommendations, including the nature and results of cooperation of the candidate with the authors of these letters;
- 4) questions pertaining to the doctoral project and other information included in the documentation submitted by the candidate



Condition of admission to the School



The requirement for admission to a School shall be a place on the Ranking list that is within the limit of places and getting no less than 50 points from the entire qualification proceedings.

Scope of the qualification examination

The scope of the qualification examination will be related to the subject of the candidate's master thesis and future Ph.D. project. The candidate obtains 3 questions and answers 2 of them.

SYSTEMATICS AND EVOLUTION

1. Origin of life (hypotheses, Miller-Urey experiment, evidence that all species on Earth are derived from a single common ancestor).
2. Endosymbiosis in evolution (hypotheses, proofs, role in evolution).
3. Characteristics of Prokaryotes.
4. Characteristics of Eukaryotic microorganisms.
5. The main steps in Plant evolution.
6. The main steps in Animal Evolution (Transition from unicellular to multicellular life forms among animals, the changes in body plan, the diversity and adaptations to the environment).
7. Fungi and their ecological roles.
8. Analogous and homologous features – definition and examples.
9. Coevolution. The meaning and examples.
10. The history of life on Earth.
11. Great extinctions during the history of the Earth - their causes and effects.
12. Systematic position of Homo sapiens and the main steps of anthropogenesis.
13. Theory of evolution. Mendelian and non-mendelian inheritance, adaptive radiation, and its examples.
14. The types of natural selection.
15. Species concepts.

ECOLOGY OF ORGANISMS

1. Biosphere and ecosystems.
2. Comparison of natural and disturbed ecosystems.
3. Cycle of water, carbon, and nitrogen in an ecosystem.
4. Changes in population density over time and factors affecting these changes.
5. Limiting factors in the environment and the concept of ecological niche.
6. Flow of energy and matter in the ecosystem (food chain).
7. Natural cycles - examples and effects on the biocenosis
8. Distribution of organisms on Earth.
9. Characteristics of biomes.
10. Human impacts on the environment
11. Concept of sustainable development.
12. Interactions of organisms in the environment.
13. Parasitism and Mutualism – comparison and examples.
14. Predation and Competition – comparison and examples.



15. Basic issues in population genetics.

CELL BIOLOGY

1. Nucleus: chromatin and envelope structure, transport through nuclear pores.
2. Mitochondria: structural molecular and functional level of their organization.
3. Protein intra- and extracellular transport.
4. Plastids: structural molecular and functional level of their organization.
5. Cell mechanics.
6. Cell cycle (phases and regulation).
7. Meiosis, gametes, and embryonal cells.
8. Determination of cell lines.
9. Embryonal and induced stem cells: obtaining and application.
10. Transcriptomics and proteomics as a tool of cell biology.
11. Mitosis, phases, and their regulation.
12. Programmed cell death.
13. Cytokinesis in different cell types.
14. Embryonic and post-embryonic development in plants and animals.
15. Prokaryotic and eukaryotic flagella.

BIOCHEMISTRY AND BASIC TECHNIQS

1. Biological membranes: structure, functions, and molecules transport.
2. Oxidative and photo-phosphorylation.
3. Proteins (four levels of protein structure), function, and stability).
4. Enzymes - classification, structure, and function.
5. Structure and functions of nucleic acids: DNA and RNA.
6. Genetic mapping.
7. Genetic analysis of metabolic pathways.
8. Lipids and their role in the cell.
9. Liquid chromatography and collision fragmentation mass spectrometry (LC-MS-MS/MS)
10. Methods for protein and peptide identification and proteomic differential analyses.
11. Cellular respiration: aerobic, anaerobic, and fermentation.
12. Metabolism - connections between individual pathways and metabolic cycles in cells.
13. Structure of the cell wall of gram-positive and gram-negative bacteria.
14. The primary and secondary metabolism.
15. The biochemistry and types of viruses.

GENETICS AND BASIC TECHNIQS

1. Principles of Mendelian Inheritance (Mendel's Laws).
2. Epigenetic modifications.
3. Complementation in diploid (*D. melanogaster*) and haploid (*S. cerevisiae*) organisms.
4. Human genetics: Mendelian inheritance, genetic diseases, analysis of pedigrees.
5. Prokaryotic and eukaryotic gene structure.
6. Mutations as causes of genetic variability.
7. Ames test as a tool for the study of mutagens.
8. Genetic code and the principles of codon-anticodon interaction.
9. Mechanisms of mutation repair.
10. Suppression and reversion of mutations.
11. Horizontal gene transfer
12. Regulation of gene expression in bacteria on the example of lactose and tryptophan operons in *E. coli*.
13. Replication, transcription, and translation - from DNA to protein.
14. Techniques for molecular RNA analysis (e.g. primer extension, RNase H cutting of RNA-oligonucleotide duplexes).
15. Methods for determining the biochemical activity of RNA-degrading enzymes, methods for the analysis of 3' ends.



BASIC METHODS USED IN BIOLOGY

1. Principles of nucleic acid sequencing techniques (Sanger method), including NGS methods (Illumina, PacBio, nanopore sequencing).
2. Basic reporter genes.
3. Cloning of genes into a plasmid vector using ligation methods and alternative methods (e.g.: SLIC, GATEWAY).
4. PCR and quantitative PCR (qPCR) reactions and their use in molecular biology.
5. Reverse transcription.
6. Cytogenetic methods and molecular diagnosis of human genetic diseases.
7. Methods of transformation of yeast and bacteria.
8. Southern and Northern blot.
9. Immunocytochemistry, and hybridization in situ (FISH) analyses.
10. Western blot technique.
11. Methods of genome modification using CRISPR/Cas.
12. Methods of DNA delivery into cells (e.g. biolistic bombardment, electroporation, PEG, Silicon carbide whiskers, lipofection, Agrobacterium, microinjection, glass beads, etc).
13. Principles of light microscopy (including fluorescence microscopy).
14. Principles of electron microscopy.
15. Methods of 3D reconstruction and visualization applied in biology.
16. Plasmids in molecular biology/biotechnology- structure, applications.
17. Cultivation of cell lines and organisms in laboratory – methods, purpose, media ingredients.
18. Cloning of genes in Bacteria. Plasmids and vectors structure.
19. Nucleic acid modifying enzymes and their applications.
20. Restriction enzymes and their applications.
21. Development of vaccines.
22. Biological methods of wastewater treatment.
23. Methods for heterologous gene expression and purification of recombinant proteins (affinity chromatography, immunoprecipitation).
24. Methods for investigation of protein-protein interactions.
25. Sci-com – current methods of communication in science.



Contact

For recruitment to the Doctoral School of Exact and Natural Sciences, please contact the School's office:



Doctoral School of Exact and Natural Sciences
2c Banacha St., 02-097 Warsaw
(room no. 0.05 and 0.06)



rekrutacja.nsp@uw.edu.pl, szkola.nsip@uw.edu.pl



<https://szkolydoktorskie.uw.edu.pl/en/sdnsip-2/>

