

Systems and Engineering Science Doctorate (SEED) programme – Marie Skłodowska-Curie actions

Guide for Applicants



**Co-funded by
the European Union**

Lappeenranta–Lahti University of Technology LUT

<https://www.lut.fi/en/seed>

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TEMPLATES
CURRICULUM VITAE

1. GENERAL DESCRIPTION OF THE PROGRAMME

The SEED programme will recruit and train **13 Doctoral Candidates** (DC) in research and innovation in engineering fields relevant to addressing global challenges, such as climate change, water conservation and sustainable value creation over a 60-month project duration.

The programme builds on a versatile scholar programme, a systematic secondment scheme and detailed communication, dissemination and exploitation measures. The systematic secondment scheme builds on each DC having an academic secondment in a European or international university of high standing and excellence and a non-academic secondment in industry in Finland.

The fields of study and research are software engineering, chemical engineering, industrial engineering & management (IEM), computational engineering, applied mathematics and technical physics.

We have 20 excellent associated partner organisations committed to hosting the DCs during their secondments. During the SEED programme we will develop more systematic and transparent selection processes for DCs, promote equal opportunities, and improve the quality of supervision and management of doctoral education. This all leads to a doctoral training programme of higher quality career guidance and more systematic skill development increasing the career prospects of the DCs in both academic and nonacademic environments.

2. TIMELINE OF THE CALL

The schedule for SEED call is detailed in table below.

Phase	Timeline (DD/MM/YYYY)
Call opens	01/03/2023
Call closes	30/04/2023
Selection process starts	01/05/2023
Selection Committees evaluate the applications	May 2023
Interviews	June 2023
Final ranking	End of June 2023
Notification of the selection outcome	Beginning of July 2023
First Doctoral Candidates start	01/09/2023

At the end of the call, 13 Doctoral Candidates will be recruited for a duration of 48 months. The best ranked candidates will be short-listed (up to max.39) for interviews and applicants will be informed of the outcome of this step by e-mail.

3. ELIGIBILITY CRITERIA, WHO CAN APPLY?

To be eligible to apply for the position, the doctoral candidate must:

- have completed an applicable higher university degree, for example Master's degree (M.Sc. or equivalent) in a relevant field. Field requirements are detailed in Section 5 (RESEARCH TEAMS & RESEARCH OPTIONS OFFERED BY THE PROGRAMME, Student Background)
- be a researcher, who at the deadline of the recruitment call is not in possession of a doctoral degree.
- have fluent English communication skills, proven by an English language test.

You can prove your proficiency in English with one of the following language test results with at least the minimum score mentioned (non-English native speaking applicants):

- [IELTS Academic](#) or [IELTS Online](#) or [IELTS Indicator](#)
6.5
- [TOEFL iBT Test, TOEFL iBT Home Edition, TOEFL iBT Paper Edition](#)
92 with no section below 20
- [PTE Academic](#) or [PTE Academic Online](#)
62
- [C1 Advanced by Cambridge English Qualifications](#)
Grade C or higher
- [C2 Proficiency by Cambridge English Qualifications](#)
Grade C1 or higher

Test dates before 1 May 2021 will not be accepted.

- fulfil the geographic mobility requirement. The SEED programme follows the general MSCA mobility requirement where the candidate may not have resided or carried out their main activity (work, studies, etc.) in Finland for more than 12 months in the 3 years immediately before the call deadline.

4. INSTRUCTIONS TO SUBMIT THE APPLICATION

LUT University's job vacancies are posted at www.lut.fi/careers . The site also includes more detailed information on career opportunities and on LUT as an employer.

Candidates will send their applications and required documents via LUT University's dedicated electronic recruiting system within the application period. Only applications send via the electronic system will be accepted. The application form can be accessed by clicking on "Submit an application" button found in an open position announcement. General instructions on how to fill out the application form can be found at <https://www.lut.fi/sites/default/files/media/documents/Instructions-how-to-apply.pdf> .

The required documents include:

- **A curriculum vitae (template is provided)**
- **Motivation letter (= application):** a separate document describing the candidate's motivation as a researcher also highlighting past achievements (max 1 page, A4).
- **Certificates/diplomas:** scanned electronic copies of diplomas and transcripts of the records of relevant previous degrees and certificate of the English language test (for non-English native speaking applicants). If the original documents are not in English, Finnish or Swedish, each document must be accompanied by an official certified translation into English or Finnish.
- **Research proposal** (max. two pages A4) which should refer to a research theme with primary supervisor and available secondments presented in the call (detailed in Section 5). After the selection, the successful applicants will refine their research plans together with the supervisors.
- Names and contact information of two **referees**
- List of scientific publications (optional)

The appendices must be in English.

Candidates are notified of the receipt of the application and during the selection process on the possible delays or other issues by e-mail. Candidates can update their application during the application period by using the username and password they receive.

5. RESEARCH TEAMS & RESEARCH OPTIONS OFFERED BY THE PROGRAMME

Lappeenranta–Lahti University of Technology LUT (LUT University) offers new DCs an excellent environment of scientific expertise, which is reflected in and supported by the research themes. These research themes are where the School of Engineering Sciences can offer high quality scientific supervision, but they should be considered as broad themes instead of specific finely detailed research topics. The DCs are expected to actively contribute to the design of the final projects. The SEED programme aims at the next level of intersectorality and transnational mobility by building on a secondment scheme including both academic and non-academic secondments. Academic secondments of each DC are hosted by European or international partners and non-academic secondments by Finnish companies from start-ups to large global enterprises.

Research themes, including primary supervision and secondments, for which the DCs can develop more detailed research plans.

5.1 [DC 1] Novel tools for improving resource efficiency of sludge treatment processes

Professor Antti Häkkinen leads a research group in solid/liquid separation. Professor Häkkinen is an expert in filtration of mineral concentrates, tailings and biomaterials and has extensive experience

in combining various chemical engineering phenomena, e.g. crystallization, classification, dissolution and chemical reactions, and empirical modelling with solid/liquid separation.

Research theme: One of the main targets of sludge treatment processes is to produce particle-free water that can be recycled with or without further treatment to be utilized again. This can be achieved by using traditional solid/liquid separation equipment such as presses or centrifuges. One major challenge is the treatment of the solid phase that remains after the solid/liquid separation. Many sludges, especially the ones that contain organic particles, are difficult to separate and this means that the solid fraction still contains a lot of water after the separation. The DC can freely propose treatment strategies for further study in the DCs research work.

Academic secondment Nanyang Technological University (SG) provides a research opportunity for the DC to get state-of-the-art knowledge and experience especially about converting waste into energy or new materials and for developing solutions and technologies for remediating contaminated material flows.

Intersectoral secondment Roxia Oy (FI) provides a unique opportunity for the DC to get familiar with testing and designing of solid/liquid separation equipment for full-scale applications. In addition to this, the candidate will learn about various opportunities to use modern digitalization tools for controlling and optimizing the operation of the separation equipment.

Student background: Applicants are expected to have a strong background in **chemical engineering**, including knowledge about separation processes, equipment design, characterization of materials and mathematical modelling.

5.2 [DC 2] Metal recovery by 3D-printed porous structures and their use as catalysts

Professor Eveliina Repo leads a research group in Hydrometallurgy for Urban Mining that focuses on the developing advanced methods for the recovery of valuable metals from the different side streams and waste effluents such as ash, slag, sludge and e-waste. The topics covered are electrochemical leaching and recovery, metal-organic-framework structures, ionic liquids, photocatalysis, and developing separation materials by additive manufacturing (3D-printing).

Research theme: Precious metals including silver, gold, platinum and palladium are highly important catalytic materials for various green applications, e.g. water purification and hydrogen production. However, their price remains high hindering the production possibilities of cheaper catalytic materials. On the other hand, these precious metals are found in low concentrations in many waste effluents including municipal wastewater. Capturing these metals selectively on suitable supports could offer a sustainable way for catalyst production by utilizing minor contents of precious metals, which otherwise would be wasted. By preparing the supports by 3D-printing from recycled raw materials would make the catalysts production even more sustainable. The DC can freely propose raw materials and innovative 3D-printing technologies for study.

Academic secondment University of Trento (IT) provides the DC a research opportunity to develop knowledge on additive manufacturing, from the perspectives of materials and process engineering.

Intersectoral secondment Electro Optical Systems Finland Oy (FI) provides the DC an opportunity to learn skills in industrial additive manufacturing, from the perspectives of product engineering in a new application domain.

Student background: Strong background in **chemical engineering**, including knowledge about separation processes, equipment design, characterization of materials and mathematical modelling.

5.3 [DC 3] Open science community technologies for environmental measuring

Associate Professor Antti Knutas supervises a group of doctoral researchers at the Department of Software Engineering. Along with the other department researchers and frequent international collaborators, he works on collaborative software construction, open science, and civic and community technologies. He is currently the coordinator of a H2020 project on participatory science communication and leads WPs in several other projects.

Research theme: Currently community-led groups, such as grassroots civic tech groups, create monitoring devices and share measurement outcomes as open data through citizen science. These efforts include air quality measurement and crowdsourcing lake water quality measurement. The data is published openly, but the groups' software development or data management practises are rarely interlinked, which limits their effectiveness. For example, measurement firmware is developed individually, and the open data is collected in separate pools. This does not lead to efficient science communication or development practices. To address the gaps in integration, publishing and interoperation, open science tools and new community approaches such as open-source software ecosystems and science communication methods can be developed and deployed. The DC can freely propose interesting approaches to overcome the presented challenge. Once the candidate is accepted, the final proposal is co-developed together with the supervisory team.

Academic secondment KU Leuven (BE) provides a research opportunity for the DC to develop deep knowledge on human-computer interaction and qualitative research methods at the Meaningful Interactions Laboratory, and on digital society at the DigiSoc Institute.

Intersectoral secondment HyXo Oy (FI) provides an opportunity for the DC to concretely build triple helix cooperation between the industry, academia and civil society.

Student background: Strong background in either **software engineering**, **human-computer interaction**, or **information systems science** and they must have knowledge and skills in software development.

5.4 [DC 4] Optimized fuels from carbon neutral circular economy

Professor Tuomas Koironen leads Chemical Process systems engineering (CPSE) research team. The research is concentrated in process research, design and intensification by physico-chemical modeling, prediction and experimentation. Computerized tools and Process Intensification are central in these activities. One of the main focus have been carbon dioxide capture and conversion to chemicals.

Research Theme: The low temperature Fischer-Tropsch (FT) process can be used to manufacture distillate fuels (diesel and/or kerosene) using CO₂ and hydrogen produced using renewable electricity to promote carbon neutrality. The process requires the use of catalysts and with multifunctional catalysts good conversion and product yield can be achieved at moderate process conditions. The challenge for the DC is to find suitable catalyst combinations and optimized process conditions for the

production of kerosene and diesel (C9-C16 paraffinic hydrocarbons) using FT-synthesis when starting from CO₂ as a feedstock.

Academic secondment Nanyang Technological University (SG) provides an international research opportunity for a DC to master skills in reactor development and in mechanistic model-based experimentation.

Intersectoral secondment Wärtsilä Oyj (FI) provides a unique opportunity for a candidate to learn industrial aspects in fuel and motor technologies as well as learning issues to implement research to business.

Student background: The position is offered in the field of Chemical and Environmental Engineering. Applicants are expected to have a strong background in this field, including knowledge about separation processes, electrochemistry, characterization of materials and mathematical modelling.

5.5 [DC 5] Collaborative working capital management in low carbon products and technologies

Professor Timo Kärrä leads a research group in Capital, Capacity and Cost Management that focuses on methods of cost management and capital investment appraisal from the perspective of managerial decision making. In collaboration with industrial partners, work revolves around the management of physical, financial and knowledge assets from an inter-organizational perspective. Regarding financial assets, research focuses on working capital management.

Research theme: In many industries, production is localized to the Far East, because of low production costs. As companies move their upstream supply chain partners closer, this causes major changes in financial flows. Companies that will replace the giants of the Far East are often weaker in financial standing. For localization to be successful, a company should be prepared to develop a comprehensive working capital management strategy for the supply chain in its quest for a less risky supply chain. The DC will examine how working capital management changes as companies move from global supply chains to local supply chains, and how the companies manage working capital finance at different stages of the supply chain.

Academic secondment Politecnico di Milano (IT) provides the DC an opportunity to build exceptional knowledge in the area of supply chain finance. The DC will gain experience of yet another academic environment and will get to know other scholars in his/her field.

Intersectoral secondment ABB Oy (FI) provides the DC an opportunity to work on working capital management models, especially from inventory management perspective. The DC will become familiar with processes, tools and systems related to working capital and inventory management and will be given an opportunity to lead an inventory improvement project.

Student background: Strong background in **industrial engineering and management**, including, sustainability, supply chain and cost management studies.

5.6 [DC 6] Study of defects in lithium and sodium-ion batteries

Professor Bernardo Barbiellini leads a research group in Computational Materials Science. The group performs research on functional materials for various technological applications. The group uses modern spectroscopy techniques and first principles computations applied to materials for

rechargeable batteries, which help unravel relationships between key battery characteristics and the nature of the electronic orbitals involved in intercalation reactions.

Research Theme: The project will address the characterization of electrode structures, charge and discharge mechanism and redox processes aimed to improve the performance of new energy batteries and to develop the design of electrode materials. The main topic is the study of structural defects induced in the battery cathode by migration of lithium and sodium ions. Especially, the effect of sodium will be considered since the intercalation of this element can introduce more defects in the cathode matrix than lithium.

Academic secondment Politecnico di Milano (IT) provides an international research opportunity for a candidate to perform state of the art positron annihilation experiments.

Intersectoral secondment Sonotecc Oy (FI) provides an opportunity for the DC to be trained in industrial R&D and process scale-up in the field of metal production.

Student background: Strong background in **condensed matter physics and materials science**, including numerical methods and programming skills.

5.7 [DC 7] Uncertainty quantification and parameter identification in electric motors

Professor Tapio Helin leads a research group in Uncertainty Quantification and Inverse Problems. The group develops rigorous computational methods for statistical inference in inverse problems. The work is applied to various imaging and parameter identification problems appearing in science and engineering such as atmospheric and medical imaging.

Research Theme: The focus of this research project is to identify and quantify uncertainty in the structural parameters of electrical motors by analyzing vibration signals from an electric motor. This mathematical problem falls within the field of inverse problems, specifically in relation to linear elasticity. The project will involve studying topics such as inverse problems, partial differential equations, and computational statistics.

Academic secondment Freie Universität Berlin (DE)

Intersectoral secondment ABB Oy (FI) provides an opportunity for the DC to obtain realistic measurement data related to state-of-the-art electric motors and understand the R&D process in industrial environment.

Student background: Strong background in **mathematics**.

5.8 [DC 8] Systemic design and innovation in waste management

Professor Leonid Chechurin leads a research group in System Engineering focusing on methods for complex system analysis and synthesis. It sees modern systems as blends of interacting socio-technical elements in various domains during a system's lifetime – from design to utilisation. The group develops interdisciplinary quantitative and qualitative approaches to the design and synthesis of complex systems.

Research Theme: There are many countries in the world in which most of dry waste is landfilled instead of recycling. Thus, millions of tons of material wait for a reasonable treatment technology

because incineration emits into the atmosphere dioxins, furans, and oxides of nitrogen and sulphur. In this research, scientifically sound tools for the evaluation of new technology and development of innovations are built utilizing a waste treatment case study.

Academic secondment University of Manchester (UK).

Intersectoral secondment EcoChange Oy (FI) provides the DC an opportunity to develop skills in industrial R&D in a global company designing and delivering power plant solutions. Priorities in innovation, standards and regulations will become more familiar to the DC through the secondment than in academia.

Student background: Strong theoretical and computation skills, knowledge in physics and chemistry, proof of research work and publications and ability to quickly learn new areas of knowledge. It is expected that the candidate has an experience in algorithm design and coding for numerical experiments as well as physical experiment automation. The project might also require modelling of various types of systems, including human-machine interaction, a previous experiences related to cognitive science can be a plus.

5.9 [DC 9] Urban socio-digital innovations for better air quality

Professor Helinä Melkas leads a research group in Smart Services. Currently the group focuses on R&D projects concerning innovation management at policy and organizational levels, sociotechnical transition, technology impact assessment, user-driven and social innovation, and regional development, inter alia.

Research Theme: Measures for urban regeneration are essential to provide citizens with sustainable and sound living conditions, including, very importantly, better air quality. This research focuses on socio-digital innovations (innovations in socio-digital participation, practices and technologies) needed in urban contexts to contribute to better future air quality. Socio-digital participation considers that digital activities are social, involving networking interaction and communication-oriented and knowledge-oriented participation. Beyond merely “using technologies”, socio-digital participation facilitates learning, much of which occurs in informal contexts. Socio-digital practices (engagement mediated by digital technologies) have transformed how people live their lives and how they socially relate to one another and the world around them. Ubiquitous use of socio-digital technologies integrates diverse learning activities, processes and contexts. These technologies offer profound new approaches for people to access connected learning, the environments of which are, for instance, “communities of practice”.

Academic secondment Politecnico di Milano (IT) provides the DC a research opportunity to gain thorough knowledge on topics related to socio-digital innovation, urban planning and air quality (for example, socio-spatial diversity, interactive tools to understand citizens’ needs and presence-online participation mix).

Intersectoral secondment Ramboll Finland Oy (FI) provides the DC an opportunity to learn in the context of advancing socio-digital participation, practices and technologies in cities, among citizens and decision-makers, with a view to contributing to better future air quality.

Student background: Strong background in **industrial engineering and management or equivalent field**, including innovation research.

5.10 [DC 10] Managing industrial facilities towards lower emissions

Associate Professor Minna Saunila leads a research group in Sustainable Global Production Systems that focuses on the management of sustainable operation and production in industrial context. Currently the focus has been on how technology and sustainability can interact to generate innovation and performance and how strategic approaches to sustainability can be attained.

Research Theme: While climate change continues harming the global environment and communities, there is a growing demand for advancing the sustainability of industrial facilities, including lowering emissions. The key hypothesis is that novel technologies will enable the provision of information to direct staff behaviors, which will enable the seamless connection between physical and digital assets and allow the sustainable transformation of industrial facilities. While the awareness and the perceived importance of lowering emissions have increased, a gap exists between an organization's aspiration towards lowering emissions and the actual managerial initiatives. More precisely, gaps exist both in the theoretical and empirical understanding of how the managerial initiatives towards emission reduction are realized and implemented in practice. The DC can freely present ways to approach the presented challenge.

Academic secondment Politecnico di Milano (IT) provides the DC a research opportunity to gain valuable knowledge regarding the integration of novel technologies in the assessment and management of sustainable industrial facilities.

Intersectoral secondment Virnex Group Oy (FI) offers the DC an opportunity to learn about the organization of advanced industrial projects that have potential to lower emissions. Understanding the practical managerial needs assists in building practically relevant research and collect high-quality data that promotes publications in top tier journals.

Student background: Strong background in **industrial engineering and management**, including operations and production management and sustainability research.

5.11 [DC 11] Novel industrial processes for bioeconomy

Professor Mari Kallioinen-Mänttari leads a research group in Biorefining that is focused to develop understanding and knowledge, which supports and facilitates the development of sustainable and resource efficient separation technology applications for biorefineries. Research is implemented at three focus areas: 1) Understanding of separation, fouling and cleaning phenomena in biorefinery applications, 2) Development of novel processes and 3) Development of novel separation matrices.

Research Theme: For bioeconomy to develop further novel processes, which enable cost-efficient and sustainable recovery and separation of valuable compounds from waste and side streams, are needed. Deep eutectic solvents (DES), which are promising green solvents, enable specific fractionation of biomass compounds at a lower temperature and pressure than e.g. conventional pulping processes, saving significantly energy needed for biomass fractionation. However, their utilization is today prevented by challenges in solvent reuse. The challenge for the DC is to develop of a membrane-based process for the recycling of DES, which is used to recover sulphur-free lignin and carbohydrate fractions from waste streams.

Academic secondment University of Twente (NL).

Intersectoral secondment CH-Bioforce Oy (FI) provides the DC an opportunity to learn about industrial technologies for converting biomass components into high value biomaterial streams and the relevant regulation.

Student background: Strong background in **chemical engineering**, including knowledge about separation processes and characterization of materials.

5.12 [DC 12] 'Innovate to zero' – New value constellations through zero-waste manufacturing and smart recycling

Professor Ville Ojanen leads a research group in Innovation and Technology Management. The group specialises in industrial innovations in digitalized ecosystems. The research efforts of the group focus on the interconnections between industrial renewal and smart manufacturing, digital service business development, and sustainability-oriented innovation, by utilizing a variety of methods derived from e.g. approaches of decision and design sciences.

Research Theme: The research theme addresses the following question: How to facilitate the cooperation - especially the information and knowledge flows - between the manufacturing organization, recycling organizations and other stakeholders in a zero-waste manufacturing ecosystem? Lifecycle thinking aims at reduction of resource use and emissions, as well as improvement of the social-economic performance of a product through its lifecycle. The current research tends to focus on beginning-of-life and middle-of-life, with less emphasis on end-of-life, where completing the information flows could play a significant role in reducing negative environmental impacts. Creation of a new value ecosystem linking different stakeholders across the product life cycle is beneficial to sustainable manufacturing, especially from 'zero-waste' and smart recycling perspectives.

Academic secondment National University of Singapore (SG) provides the DC an international research visit in a top-rated Asian university and an opportunity to strengthen the skills in knowledge management, new product/service development and energy efficiency. The cooperation also enables richer data sets from empirical comparative research of value ecosystems in zero-waste manufacturing and product-service systems.

Intersectoral secondment Haptronics Oy (FI) provides the DC the opportunity to learn about strategic development in the industry when delivering smart control and guidance solutions for heavy machinery. The candidate will have the opportunity to learn also about biometrics.

Student background: Strong background in **industrial engineering and management**, including methods of technology and innovation management, digitalization in industries and sustainable development.

5.13 [DC 13] Machine learning in forecasting and allocation of distributed energy resources

Professor Lasse Lensu leads a research group in Computer Vision and Pattern Recognition. It has its basis in computer science and engineering with the specialization in computer /machine vision, pattern recognition based on machine learning, and data analysis.

Research Theme: Decentralization of energy resources is an ongoing trend, supporting the decarbonization of energy system. Distributed energy resources, such as microgeneration, energy

storages, and electric vehicles, provide the flexibility for the power system, which is required for system stability. However, the challenge here is to forecast the availability of the resources, and optimally control the active resources based on the system demands. The objective of this study is to develop and test modern machine learning methodology for probabilistic forecasting the system state and resource availability, and based on these, allow optimised allocation of distributed energy resources. Real-life data of energy production and consumption will be applied in the testing of the methodology. Practical implementation of the research results will promote the cost-efficiency, reliability, and sustainability of the power system and provide added value for the owners of the energy resources by improved market access potential.

Academic secondment Politecnico di Milano (IT).

Intersectoral secondment GreenEnergy Finland Oy (FI) provides a unique possibility for the DC to become acquainted with the state-of-the-art and deployment of the developed methods in energy industry. Understanding the practical needs helps in transforming the industry, lays a foundation for innovations and understanding of standards and enables publications with societal impact.

Student background: Strong background in **computer science and engineering** or **applied mathematics** with focus on data analysis and machine learning, understanding of mathematical models, and programming skills (Julia, Python or Matlab). In addition, knowledge of energy system fundamentals is an advantage.

5.14 Research data management and research outputs

We commit to Open Science in our Action Plan for Research. We integrate open science principles in dissemination and communication activities to strengthen the impact of our project results. We also have our own Research Data Policy. The research data produced at LUT University is, as a rule, open and available for shared use when possible. We recommend researchers to use public Open Science infrastructures in depositing research publications, research data and research methods. The common recommendation is to use CSC (IT Centre for Science, Finland) research data services, so called [Fairdata-services](#). The DCs are expected to prepare at the beginning of their project a Data Management Plan (DMP) using the Finnish data management tool DMPTuuli and following the FAIR principles.

Consideration for making the data available for other researchers will be paid in the DMP preparation. Where appropriate and following the recommendations of LUT University the data will be made available for other researchers from the Fairdata or other similar services. We recommend either gold or green open access strategies. In addition to the selected number of publications made openly available by paying article processing charges, all other publications from the DCs will be made openly available through green open access (self-archiving) and by publishing the post-print versions of the articles in publicly accessible repositories (such as LUT Pub) as soon as possible.

Research results will be published in high-impact peer-reviewed journals. To gain a doctoral degree in Finland researchers need to publish peer-reviewed articles and we estimate that our researchers will have **at least four peer-reviewed publications each**. In addition to peer-reviewed journal publications, the researchers should produce conference papers aiming especially for oral presentations at the conferences.

6. TRAINING PROGRAMME

The training programme will satisfy the requirement of complementary studies for **40 ECTS credits** in addition to **the training through research work** for the doctoral degree. Each SEED DC will have a dedicated study plan that will be agreed upon with the supervisory team at the beginning of the programme and that is included in the personal career development plan (PCDP).

SEED scholar programme

Training by research

Doctoral dissertation includes at least 4 peer-reviewed publications on the research and the summary thesis on the work.

- Knowledge of research methods and practices.
- Skills in scientific writing for publications and understanding of the publication process.
- Experience gained through secondments on interdisciplinary and intersectoral environments.

Complementary studies (40 ECTS Credits)

Transferrable skills

- Grant writing course
- Entrepreneurship for Academics
- Communication and management
- Other voluntary courses, including language courses on Finnish and English
- Confidentiality and IP Management.

Subject specific skills

- Doctoral courses offered by LUT and partner organisations
- Courses offered by training networks
- Book reviews
- Conferences and seminars

Scholar programme activities

The SEED programme will introduce annual **Scholar Training Schools**, which will be supported by our wide partner network. The training schools will be held at LUT and they will gather the DCs and supervisors from LUT and partner organisations. The Scholar Training Schools will be built around Scholar Events and specific training courses. The Scholar Events promote awareness and collaboration across research themes targeting the objectives of the programme. Each training school will have a specific topic course that is relevant to all DCs and supports the development of key transferable skills.

Secondment programme

Each DC will have in their project **two secondment periods**, 10-12 months in academic partner organisation abroad and 4-6 months in non-academic partner organisation in Finland. We have overall 12 industrial partners each acting as secondment host providing guidance for their Doctoral Candidate and offering experience in non-academic environment for the DCs. Industry representatives also participate in the Scholar Training Schools in discussions but also in the training. For example, they will have active role in the workshop on developing a business idea.

Communication activities

Sustainability and the impacts of our way of life on our environment are widely interesting in our society leading to the topics of the SEED programme being interesting to a large number of target audiences. DC's participating in the SEED programme will present their research to the research society and different stakeholders as oral presentations, posters or demonstrations. DCs are expected to be active communicators and e.g. set up social media accounts to promote their work and the SEED programme as ambassadors.

7. APPOINTMENT CONDITIONS, WHAT WE OFFER?

In Finland, doctoral studies take four years. To cover the whole 48 months of studies, we are offering a **12+36-month full-time employment contract**. The DCs of the SEED programme will have the same rights and obligations as the other researchers in same level positions at LUT. The DCs are expected to finish their doctoral degree within four years.

The fair and equal treatment of personnel and protecting the rights of the employer are top priorities in decision-making related to employment relationships. DCs employed by LUT are covered by Finnish work-based social security, the benefits include for example, earnings-related pension, earnings-related unemployment benefits as well as benefits for accident at work and work-related diseases. If the DC will take parental or sick leave during the project their contract will be extended by the same number of months, and we will cover the expenses of the extension not covered by the long-term leave allowance of the MSCA. All employees of LUT are covered by separate insurance while working at LUT and they will also be provided travel insurance that covers them during travels such as research visits and conferences.

LUT follows the national university salary system (YPJ), and the salaries for the doctoral candidates are based on the system. In the system, the starting pay level depends on the position as well as the experience of the employee. The pay level will be checked annually, and it will increase as the studies and research tasks progress according to the YPJ rules. The typical **gross annual starting salary** (without side costs) for a doctoral candidate is **approximately 30 800 euros** (plus a holiday bonus in accordance with the collective agreement).

Travel allowance will cover the expenses (travel, accommodation and daily allowances) during the secondments, which are max. 16 months, and at least 1 conference attendance.

The DCs will receive a laboratory space when necessary and will be given office space and laptops as well as necessary software to work with. They will have access to LUT Academic Library and access to online databases available to all our personnel. University has several cafes and canteens at the campus to provide food and drinks with a reasonable price. There are also staff rooms available with

kitchen facilities to have lunch and coffee breaks. University has a sports hall and gym that are available to all staff and students. The DCs with disabilities are taken into consideration and for example most of the campus area is easily accessed by wheelchair.

The HR, Doctoral School and SEED management will be available to assist the researchers during the recruitment period as well as during the programme. They will help with administration of studies and with employment issues and will provide support with the practicalities of moving to Finland and with for example paperwork for residence permits. They also arrange a welcome meeting when the researchers start working. In the meeting, they will go through the general practicalities of working at LUT and doctoral studies. A new employee will be provided with an overall idea about LUT, its objectives and activities, and employees' rights and responsibilities, staff benefits and available support services.

8. SELECTION PROCESS AND EVALUATION CRITERIA

The SEED programme will follow The European Charter for Researchers and The Code of Conduct for the Recruitment of Researchers. We employ a detailed selection process comprising of four stages. The selection process proceeds as follows after the call deadline (April 30, 2023):

Eligibility (stage 1)

The eligibility check is done by LUT University against the predefined eligibility criteria. The applicants not fulfilling the eligibility criteria will be notified immediately after the eligibility check, and if unable to provide the necessary qualifications (in one week after being notified) they will be removed from the selection process. Eligibility criteria is described in section 3.

Evaluation (stage 2)

Two stage evaluation will be used in the selection process: 1) evaluation based on application documents and 2) interview.

A Selection Committee will be established for each of the 13 Doctoral positions.

The evaluators will use a modified MSCA-PF framework to evaluate the application documents in the first stage. Evaluation points are:

1. *Quality and pertinence of the project's research and innovation objectives (and the extent to which they are ambitious, and go beyond the state of the art) (30 %)*
2. *Soundness of the proposed methodology (including interdisciplinary approaches, consideration of the gender dimension and other diversity aspects if relevant for the research project, and the quality of open science practices) (30 %)*
3. *Quality and appropriateness of the researcher's professional experience, competences and skills (40 %)*

The final scores are based on individual evaluations and consensus discussion. In line with the MSCA-PF framework applicants can **score a maximum of 5 for each of the points above** (with steps of 0.1) with a score of 4 being the threshold for each point. The final score is the weighted average of all the points and a final score of 4 is the threshold criterion. Only those applicants exceeding the threshold will be considered for the interviews.

Interviews (stage 3)

Interviews will be conducted online by the Selection Committee of each Doctoral Candidate position. The interview includes a 10 min presentation by the candidate and a 20 min Q&A session.

Applicants exceeding the threshold criterion for the first stage (application documents) will be selected for interviews. In case there are several applicant scoring above the threshold, three of the best scoring applicants will proceed to the interviews. In case of several equal overall scores, the score on professional competence will determine the order of the applicants (and then the soundness of the methodology and finally the quality of the objectives, if equal scores still stand). The second stage consists of the interview. The evaluation points for the interview are:

1. *Scientific presentation skills and overall communication skills (30 %)*
2. *Motivation for the position, to work at LUT and within the secondment scheme, and for the research topic (30%)*
3. *Strengths, including the ambition to develop skills as a future scientist (40 %)*

Final ranking (stage 4)

A final list is compiled based on the calculated final scores. Applicants are placed in order of score and the applicant scoring highest will be proposed for final selection. In case of equal scores, less represented gender in the field is selected. If there is no difference in gender, the interview will be the deciding factor. If the overall interview scores are equal, strengths determine the ordering, then motivation and finally presentation skills.

After the selections of the DCs, all applicants will be informed about the decision by e-mail providing them with the evaluation summaries. The interviewed applicants ranked but not chosen will be informed about their placing on the waiting list – they can also choose not to stay on the list. In case a selected applicant refuses the position, the applicant with the second-best score for that specific position is offered the position.

Redress can be sought for 2 weeks after the notification, if the applicant considers that, based on the evaluation summary provided, some of the applicant's qualifications have not been considered properly.

9. CONTACT

The SEED programme will arrange innovative Q&A events (2) online for prospective applicants while the call is open. The Q&A events will be participated by the primary supervisors and the supervisory board and will allow for the prospective applicants to ask questions regarding the research topics and the programme.

For further information and to obtain the details of the Q&A events, please contact:
LUT.SEED@lut.fi.

Technical support for using the recruitment system: recruitment@lut.fi

10. ANNEXES

The CV Template

When using the template, please pay special attention to the headings (1–10). The sub-sections presented under the headings are included mainly for illustrative purposes.

1. Personal details and the date of the CV

- Surname (including previous surnames)
- First names
- Researcher ID, if applicable (e.g. ORCID, ResearcherID)
- Date of the CV

2. Degrees

- Date of degree certificate (the most recent one first), degree title, major subject/degree programme or equivalent, name of the educational institution, locality and country where the degree was completed; contact details of the organisation that granted the highest degree; official degrees are stated according to the Finnish and international system.

3. Other education and expertise

- Other education, professional competences/qualifications or supplementary training: date of completion, name, scope and provider of the education or training (name and locality)

4. Language skills

- Native language
- Other language skills: the level achieved and the date of certificate, or a justified self-assessment of skills.

5. Current employment

- Start and end date of employment relationship, current job title, employer and place of work (if the work is part-time, this should be stated; a short job description should be provided if necessary)

-
- For a full-time student: educational institution (name and locality) and degree title, degree programme or equivalent
 - Secondary occupations

6. Previous work experience

- Previous employment relationships and grant periods (the most recent one first), including long-term visits abroad: the start and end date of the employment/role, job position, employer and place of work or funding organisation (if the work is part-time, this should be stated; a short job description should be provided if necessary)
- Previous secondary occupations and other positions and commitments that are relevant to the application (e.g. in companies)

7. Research funding and grants

- Significant research funding: start and end dates of funding, type, source and amount of funding; role in the preparation of funding applications for a research group; name of principal investigator

8. Research output

- Total number of publications; links to open-access publications;
- Methods, software, infrastructures, materials, guides and tools developed
- Patents and inventions
- Most significant artistic works and processes

9. Awards and honours

10. Other merits

- Other positions and commitments of relevance in terms of the purpose of the CV (such as work in companies or organisations)
- Other societal merits and honours if desirable
- Other expertise of relevance in terms of the purpose of the CV