



Interdisciplinary connectivity:
 Understanding and managing
 complex systems using
 connectivity science

**AUSTRIA'S LEADING
 INTERNATIONAL
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Doctoral Research Fellowship (PhD)

Title: Flows of critical (energy) resources
Location: Modul University Vienna
 Am Kahlenberg 1
 1190 Vienna | Austria
Duration: 3 years
Closing date: 30th January
Contacts: Christian Kerschner: christian.kerschner@modul.ac.at
 Dimitris Christopoulos: dimitris.christopoulos@modul.ac.at

Gross Living Allowance: 32 088 € per year plus mobility allowance. Salary is subject to national taxes and employer's costs. The offer includes a fee waiver for all 4 years of the PhD programme worth 45.000€.

PhD Research project

In this PhD project secondary data e.g. from the World Bank or the International Energy Agency (IEA) and insights from the recent H2020 project MEDEAS will be used to: (1) Bring in and advance theoretical and empirical insights from Ecological Economics, Industrial Ecology, Energy Analysis, Graph Theory, Networks Science and Game Theory; (2) Use these insights to draw analytical maps of the global network of oil (energy) flows in the socio-economic system, taking into account both quantity and quality of the resource including price mechanisms; (3) Quantification of flows for the design of a 'mind-sized' oil (energy) flow-model e.g. system dynamics combined with Input-Output models and social network analysis; (4) Identify critical nodes that determine flows and systemic robustness, which could be used as flow-limiting agents for policies designed to meet carbon budgets and counteract limitations (resource peaks). Moreover, this is expected to provide theoretical insights into the specific functioning of the energy-economy nexus; help to make the link with other nexus e.g. the water-economy nexus and to explore the "why" of connections within networks (as to the "how").

The project includes research collaboration with IIASA (AT), Masaryk University Brno (CZ), University of Groningen (NL), Jacobs University Bremen (G), European University Cyprus, the UK Environmental Agency and dependent on the specific research needs other partners of the network.

Applying for this position

To apply for this position, we require a copy of your CV, degree transcripts, motivation letter, published or Master thesis sample writings, short description of how you would approach the research project (1 page max) and the names of two referees. For further information and inquiries about the position, please contact Christian Kerschner or Dimitris Christopoulos. Please indicate in your motivation letter if you are interested in being considered for any of the other PhD positions in our network (and that you are happy for your data to be shared with the respective institution).

Context

This research fellowship programme (PhD) will be carried out within the context of the i-CONN network, a Marie Skłodowska-Curie Actions– Innovative Training Network (ITN) – project funded by the European Commission, under the H2020 program. Through the project activities, the Fellows/PhD students will have the opportunity to come in contact and collaborate with some of the best European research groups. English is the official language of the i-CONN project. Additional details are available in "Further particulars".

Modul University Vienna is an international private university owned by the Vienna Chamber of Commerce, the largest provider of private education in Austria.

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We Offer



Flexible working hours



International team



Training opportunities



Independent working environment



Responsibilities

1. Perform high quality research in the bespoke research project under the guidance of the supervisory team.
2. Assist with the development of research goals and objectives.
3. Develop and test new hypotheses, analysing scientific data from a variety of sources, assessing, and refining working hypotheses as appropriate.
4. Meet the members of the supervisory team on a regular basis to discuss their research on a regular basis.
5. Widen their personal knowledge in the research area and undertake complementary training.
6. Directly contribute ideas to the direction of the research project supported by detailed and critical reference to previously published literature and knowledge exchange through the i-CONN network.
7. Keep comprehensive, accessible, secure records of all experimental and modelling work, data, and analyses.
8. Prepare regular research reports and participate in scheduled face-to-face and online meetings including presentation of research results.
9. Liaise effectively with all members of the local and international research team.
10. Participate in the activities of the Network as specified in the Grant Agreement and/or required by the node coordinator, including secondments in other network nodes and taking part in the network meetings and in the training activities.
11. Write up the results of the research activity and present research papers and publications at meetings and conferences, as advised by the supervisors, and contribute to the overall goals of the network.
12. Keep records of the activities, such as research, training, secondments, visits, leave of absence, etc.
13. Be prepared to undertake some aspects of undergraduate student teaching, which may include small-group teaching (workshops and tutorials) or class demonstrating.

Person Specification

The successful candidates *must satisfy the eligibility criteria* (see below) and have:

1. A Master's degree (MSc) or equivalent in a relevant quantitative discipline, in particular of the social sciences e.g.: Sustainability Sciences, Ecological Economics, Resource Economics, Industrial Ecology, Energy Studies, Networks Science, etc.
2. A keen interest in pursuing research in the development of Connectivity Science in relation to the nexus between energy and resource flows and the human society/economy.
3. Good computational skills
4. The ability to work independently and as a member of a research team.
5. Excellent interpersonal and communication skills.
6. Well-organised and highly-motivated with good time-management skills and the ability to focus on project objectives.
7. Willingness to assist with day-to-day operation of the research group, to assume a share of group responsibilities, and to contribute to impact reports, dissemination and outreach activities, including updates of the i-CONN project website, secondment and training event reports, posters, etc.
8. A good command of English language, with excellent oral and written skills.
9. Willingness to travel internationally for training events, secondments and conferences.
10. Willingness to re-locate to reside within a reasonable distance of Modul University (or seconded institution) for the duration of the post.

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Desirable

- Any or combination of the following will be a clear advantage:
- A demonstrable ability or potential to produce research published in peer-reviewed journals and other outlets with quality assurance.
- Experience in nexus research (Resources-Economy-Society).
- Experience with analytical software such as R
- A good strategic fit with existing research expertise in the host institution and the i-CONN network
- Interest in Post-Growth or Degrowth perspectives
- Prior grass-root/hands-on experience with the subject to be studied.
- Knowledge of, or willingness to learn, the language of the host institution (German).

Eligibility Criteria

To satisfy the eligibility requirements set for an Early Stage Researcher (ESR) funded by Marie Skłodowska-Curie you:

1. should have — at the date of recruitment — less than 4 years of a research career, and not have a doctoral degree. The 4 years are measured from the date when the ESR obtained the degree which would formally entitle them to embark on a PhD, either in the country where the degree was obtained or in the country where the PhD is provided.
2. should not — at the date of recruitment— have resided in the country where the research training takes place for more than 12 months in the 3 years immediately prior to recruitment, and not have carried out your main activity (work ,studies, etc.) in that country (trans-national mobility). For refugees under the Geneva Convention (1951 Refugee Convention and the 1967 Protocol), the refugee procedure (i.e. before refugee status is conferred) will not be counted as 'period of residence/activity in the country of the beneficiary'.
3. satisfy the eligibility requirements to enrol on a PhD degree. This includes acceptable English language requirements if English is not your first language.

Further particulars

Modul University Vienna equal opportunities

Modul University Vienna is an equal opportunity employer with a strong commitment to equality and diversity that does not discriminate on the basis of disability, gender or gender expression, sexual orientation, age, social class, nationality, religion, ethnicity, race or color. We especially encourage qualified women and members of minority groups to apply and welcome all applications that can contribute to a diverse working culture.

Allowance eligibility depends on the personal circumstances of the fellow:

Marie Skłodowska-Curie PhDs are paid a competitive gross salary of 3,270 € per month, adjusted for their host country, a Mobility Allowance of 600 € per month and, for researchers who have a family, a Family Allowance of 500 € per month. All amounts are subject to employers' and employees' deductions and taxes.

Family is defined as persons linked to the researcher by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognised by the national legislation of the country of the beneficiary or of nationality of the researcher, or (iii) dependent children who are actually being maintained by the researcher; family status is determined at recruitment and does not evolve.

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The i-CONN project

In recent years, parallel developments in disciplines as disparate as Ecology, Geomorphology, Neuroscience, Social Science and Systems Biology have focused on what is termed connectivity. In its simplest form, connectivity is a description of the level of connectedness within a system, and can be quantified in terms of structural connectivity (SC) which describes how elements within a system are physically or spatially connected, and functional connectivity (FC) which describes how the strength/presence of these connections varies over space and time.

In all of these disciplines, connectivity has been a transformative concept in understanding and describing what are considered to be complex systems, allowing unprecedented analysis of how such systems behave. Connectivity research is more than a way of grouping elements in a system together based on their SC, but is driven by the notion that a structural network will systematically shape the dynamical processes (and hence the function) within this system. As a consequence, relationships between structural and functional connectivities need to be evaluated and studied on all topological scales. Whilst conceptualisations and approaches to quantify connectivity have evolved largely within their disciplinary boundaries, similarities in the concept and its application among disciplines are also evident.

i-CONN will exploit synergies among different conceptualisations and applications of connectivity. For example, we will evaluate statistical approaches and mathematical theories that have arisen across a range of disciplines in order that we might develop generic connectivity tools to understand better the characteristics of complex systems. i-CONN will provide interdisciplinary training integrating knowledge and methods from different disciplines and stakeholders from the public, private and NGO sectors, using a synthesis of approaches that will lead to transdisciplinarity, whereby a unity of intellectual frameworks will be created beyond the disciplinary perspectives.

i-CONN brings together leading academic and non-academic partners across Europe from those disciplines that have led advances in Connectivity Science with the goal of training a new generation of experts in the application of connectivity concepts to advance both research and practical understanding to address this need. i-CONN will train ESRs to become experts with a unique skill set that includes interdisciplinary scientific techniques and applications of Connectivity Science, to address real-world challenges through a bespoke series of specialized training courses and secondments.

The i-CONN network

Coordinator: Durham University, Durham UK.

i-CONN Beneficiaries

AAI Scientific Cultural Services Ltd. (Cyprus), Aix-Marseille University (France), BOKU (Austria), Durham University (UK), European University Cyprus (Cyprus), Jacobs University (Germany), Masaryk University (Czech Republic), Modul University Vienna (Austria), University of Vienna (Austria), University of Groningen (Netherlands)

i-CONN partners

IIASA (Austria), The University of Sheffield (UK), Environment Agency (UK)

Data protection

The i-CONN Network is committed to respecting the confidentiality of the information provided by the applicant: personal data collected for the present proceeding will be processed for the sole purposes connected with and instrumental to the selection procedure and the eventual management of the job contact, in conformity with the current provisions. The person responsible for the Personal Data Handling is the principal investigator at the host institution.

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