

11 positions of Early Stage Researchers and 4 positions of Experienced Researchers within a Marie Curie Initial Training Network (ITN)

Sustainable and Integrated Urban Water System Management

SANITAS

Call for applicants: January 2012

SANITAS consortium – (Marie Curie Initial Training Network) – invites applications for several **full time research vacancies**, including **experienced researchers (ER)** and **early stage researchers (ESR)**. Selected researchers are expected to undertake mobility in order to implement an **Individual Research Project (IRP)** at one of the consortium partner institutions, as well as to participate in a sustained training programme.

1. Description of the SANITAS

SANITAS (*Sustainable and Integrated Urban Water System Management*) is a Marie Curie Initial Training Network, funded by European Commission under the 7th Framework Programme, and coordinated by LEQUIA research group (*Laboratori d'Enginyeria Química i Ambiental - Laboratory of Chemical and Environmental Engineering*) from *Universitat de Girona*. SANITAS aims to create a platform of mobility and training of young researchers, both pre-docs (Early Stage Researchers) and post-docs (Experienced Researchers), by means of individual research projects, exchange of knowledge among appointed fellows, researchers and consortium partners, attendance to workshops and seminars, as well as training in research complementary skills (project management, team leadership, intellectual property rights, environmental policy, etc). SANITAS will facilitate the contact between researchers, the water authorities and industry, thus promoting synergies among them.

SANITAS aims to create the next generation of professionals for sustainable and integrated Urban Water System (UWS) management by providing a unique, European-wide training platform in the technical and complementary skills they require. This is

needed to face the current critical challenges in wastewater management. Besides, the near future might bring about dramatic regional variations in water supply - either as local excessive surplus or local deficiency in water supply – as well as unpredictable variations in water quality, placing unprecedented demands on UWS's. SANITAS is acutely aware of many unmet needs regarding deficiencies in manpower and application of innovation to the field. Partners of SANITAS aim to create a critical mass of excellence that will drive the innovation required to comprehensively address the fundamental rethinking of water use and management that current and future situations demand. By drawing on expert participation from academia, industry, water authorities and policy specialists, SANITAS will critically examine and develop the cutting edge skills required to meet the UWS challenges that the world needs in facing water quality and supply and energy requirements of wastewater management. SANITAS will explore the use of existing and new developments on modelling, control and multicriteria decision making for UWS optimisation.

For more information see:

- SANITAS webpage: www.sanitas-itn.eu
- Marie Curie Actions webpage:
<http://ec.europa.eu/research/mariecurieactions/>

2. Eligibility criteria

- Nationality: Nationals from any country may apply
- Mobility: at the time of the recruitment, the researcher must not have resided or carried out his/her main activity (work, studies, etc.), in the country of the chosen host institution for more than 12 months in the 3 years immediately prior to the date of the recruitment.
- Research categories:
 - a. *Early Stage Researcher (ESR)*: researchers who, at the time of the recruitment, have not yet been awarded a doctorate degree and are in the first 4 (full-time equivalent) of their research careers, including the research training period that would entitle them to a doctorate.
 - b. *Experienced Researchers (ER)*: researchers who, at the time of recruitment 1) possess less than 5 years (full time equivalent) of research experience **and** 2)

are already in possession of a doctoral degree, independently of the time taken to acquire it **or** 3) having at least 4 years of research experience (full time equivalent) after obtaining the degree which formally allows them to embark in doctoral studies in the country in which the degree was obtained or in the country where the Individual Research Project IRP is implemented.

3. General evaluation criteria

- Educational background relevant for the chosen position/IRP (for both ER and ESR). For ESRs, a master degree is desirable.
- Previous research experience, relevant to the chosen position/IRP.
- Language skills (English compulsory).
- Networking and communication skills (to be evaluated in the interview).
- Others (depending on the chosen IRP).

4. How to apply

Applications must be completed entirely online and will include:

- Application form (including a brief research statement of on how the applicant may contribute to the chosen IRP*)
- Curriculum Vitae (Europass format recommended)
- 2 recommendation letters

IMPORTANT: No copies of diplomas or other supporting documents are necessary at this stage. However, please note that shortlisted candidates will be required to provide with certified copies of their degrees before the interview.

5. Recruitment calendar

- Deadline for applications: **February 23rd, 2012**
- Notification to candidates shortlisted for interview: **March 9th, 2012**
- Interviews** with selected candidates: **March 23rd (Barcelona), 2012**
- Notification of selected candidates: **April 1st 2012**
- Contract begins on: **see starting date for each IRP**

** You should apply for at least one IRP and explain your choice, but also state 2 more IRPs (by order of preference)*

***Funding can available to cover the return trip to Barcelona of selected candidates upon request. Skype interviews can also be arranged on a case-by-case analysis.*

6. List of Individual Research Projects (IRP)

| Fellow code: ESR 1 | |
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| Title of individual research project | Decision making and multicriteria analysis (environmental, economic impacts) in UWS |
| Host institution | University of Girona (Spain) http://lequia.udg.es/ |
| Brief description of individual research project | <p>The <u>main objective</u> is to develop decision support tools for sustainable design and integrated management of the UWS. The sub-objectives are: 1) to define a simulation protocol to evaluate the performance of the system against several perturbations, 2) to use system's analysis techniques and heuristic knowledge to facilitate the interpretation of results, and 3) to use multicriteria analysis to select the most suitable solution for each problematic situation. The provided solutions should maximize water quality (nutrients and micropollutants), minimize treatment costs and increase reliability.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of August 2012 |
| Educational requirements | Environmental, chemical or civil engineering or environmental science. |
| Other specific requirements | Knowledge in wastewater treatment modelling; multicriteria analysis; decision support systems is desirable |

| Fellow code: ESR 2 | |
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| Title of individual research project | Energy optimization in membrane integrated systems for water reuse |
| Host institution | University of Girona (Spain) http://lequia.udg.es/ |

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| Brief description of individual research project | <p>The research objectives are 1) to reduce energy requirements of the whole integrated membrane process (biological aeration, MBR air scour and RO/NF pumping); 2) to optimize the biological nutrient removal and the removal of emerging priority pollutants, bacterial and viral indicators; 3) to develop and validate an automatic control system for the integrated control of the filtration process and the biological process; and 4) to study sustainable treatment options for the RO concentrate treatment and sludge wasted.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May 2012 |
| Educational requirements | Environmental or chemical engineering |
| Other specific requirements | Previous experience with MBR or RO is an asset |

| Fellow code: ESR 3 | |
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| Title of research project | Anaerobic processes for energy conservation and biotransformation of pollutants |
| Host institution | Wageningen University (Netherlands) http://www.wageningenuniversity.nl |
| Brief description of individual research project | <p>The research objective is to study the microbiology of methanogenesis in order to optimize biogas formation from organic rich wastewater under conditions of metals and chlorinated compounds biotransformation.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May, 2012 |
| Educational requirements | MSc in Life Sciences or Engineering |
| Other specific requirements | Experience with anaerobic microorganisms and good knowledge of microbial physiology |

| Fellow code: ESR 4 | |
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| Title of research project | Catchment based and real-time based consenting |
| Host institution | University of Exeter (UK) http://www.exeter.ac.uk/ Contact: Dr Guangtao Fu, g.fu@ex.ac.uk |
| Brief description of individual research project | <p>The research objective is to explore the possibilities of catchment based consents (CBC) and real-time-based-consents (RTBC) approaches and demonstrate, optimise and rank options based on their performance on a real catchment. The research will involve the use and development of existing integrated catchment models as the evaluation framework. A thorough analysis will be carried out of emerging CBC and RTBC approaches, plus investigation of their limited use in practice. Using techniques developed at the Centre for Water Systems, new approaches will be devised and tested with the goal to derive improved performance across the various key criteria.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May, 2012 |
| Educational requirements | Applicants will possess an undergraduate degree (2:1 or above) or equivalent in Water and Environmental Engineering and have a background or skills in the following areas: computer simulation, modelling of urban wastewater systems or system optimisation and control. |
| Other specific requirements | <ul style="list-style-type: none"> - MSc in the field of water and environmental engineering is desirable. - Excellent written and verbal communication skills - Ability to conduct high quality research. - Ability to build contacts and participate in internal |

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| | and external networks for the exchange of information and collaboration. |
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| Fellow code: ESR 5a | |
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| Title of research project | Biodegradation of micropollutants |
| Host institution | Catalan Institute for Water Research – ICRA (Spain) http://www.icra.cat/ |
| Brief description of individual research project | <p>The research objective is to investigate biodegradation mechanisms of target micropollutants by different approaches. Despite the uncertainties on the effects of micropollutants into the environment (i.e. pharmaceuticals) and the lack of knowledge regarding their degradation, increasingly stringent discharge limits are expected. Biodegradation in a WWTP is the only real micropollutant elimination step and, therefore needs to be optimized. However, knowledge of biodegradation mechanisms and operational parameters influencing biodegradation are lacking.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 18 months, starting on the 1 st of May 2012 (dates under revision: possible delay of starting date till 1 st of November 2013) |
| Educational requirements | <ul style="list-style-type: none"> - Background in biotechnology, chemistry, environmental sciences and engineering. - Excellent academic track record |
| Other specific requirements | <ul style="list-style-type: none"> - Good oral and written communication skills in English. - Proven laboratory skills and experience. - Previous experience on molecular microbiology, analytical chemistry (preferably pharmaceutical compounds) and activated sludge will be valued. |

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| | - Interest in interdisciplinary research in the topics of wastewater treatment, microbiology and chemistry |
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| Fellow code: ESR 5b | |
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| Title of research project | Assessment and control of sewer detrimental emissions for optimal Mediterranean UWS management |
| Host institution | Catalan Institute for Water Research – ICRA (Spain) http://www.icra.cat/ Contact: ogutierrez@icra.cat |
| Brief description of individual research project | The research objective is to 1) identify the extent of sulfide emissions from characteristic Mediterranean sewers, 2) to design and apply best control strategies for the cases studied, and 3) integrate the knowledge in the tools for the management of Urban Water Systems. More info? See IRP section at www.sanitas-itn.eu |
| Duration of appointment | 18 months, starting on the 1 st of May 2012 |
| Educational requirements | - Background in biotechnology, chemistry, environmental sciences and engineering. - Excellent academic track record. |
| Other specific requirements | - Good oral and written communication skills in English and Spanish. - Ability and willingness to work on full scale sewer environments. - Previous experience on sewer systems and in field-full scale works will be valued. |

| Fellow code: ESR 6 | |
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| Title of research project | Detailed modelling of GHG emission from WWTP using integrated CFD and biological models |

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| Host institution | Dept. of Mathematical Modelling, Statistics and Bioinformatics, Ghent University (Belgium) http://www.ugent.be/en |
| Brief description of individual research project | The research objective is to develop, calibrate and validate an integrated CFD–ASM model for predicting nitrous oxide from WWTPs and to develop compartmental model to test mitigation strategies for reduction of nitrous oxide emissions and validate in practice for several case studies. More info? See IRP section at www.sanitas-itn.eu |
| Duration of appointment | 36 months, starting on the 1 st of May 2012 |
| Educational requirements | <ul style="list-style-type: none"> - MSc in Chemical, Bio-science or Environmental engineering. - Strong interest in mathematical modelling and experimental data collection using advanced techniques. Literate with modelling tools. |
| Other specific requirements | - Knowledge of CFD as well as programming skills are desirable assets. |

Fellow code: ESR 7

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| Title of research project | Development of a system–wide benchmark system for Urban Water Systems (UWS) |
| Host institution | Division of Industrial Electrical Engineering and Automation, Faculty of Engineering, University of Lund (Sweden) http://www.iea.lth.se (specific) http://www.lunduniversity.lu.se (general) Contact: Dr Ulf Jeppsson (ulf.jeppsson@iea.lth.se) |
| Brief description of individual research project | The research objective is to develop a set of benchmark simulation models (BSMs) for control strategy development and evaluation of urban water |

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| | <p>systems. The BSMs will serve as common software platform within the SANITAS project. ESRs 7, 8 and 9 will be working in parallel along two tracks, a bottom-up (BU) and a top-down (TD) approach. ESR 7 (TD) will focus on inclusion of catchment, sewer network, storm-tanks, combined sewer overflows and (receiving) water quality models into the BSMs as well as developing and testing control strategies on an UWS scale. The result will be a powerful and useful tool for the wastewater industry in Europe and open up significant new opportunities for educational purposes as well. The candidate will also undertake graduate education, by taking Ph.D. courses or in other forms.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May, 2012 (with possible extension of up to 12 months to complete a Swedish PhD degree) |
| Educational requirements | Candidates should have a MSc degree in chemical, environmental, civil engineering or similar (academic exam corresponding to at least 240 ECTS, out of which at least 60 ECTS on advanced level). Courses/experience in mathematical modelling and control is an extra qualification. |
| Other specific requirements | <ul style="list-style-type: none"> - Knowledge of water/wastewater treatment technologies especially biological processes. - Programming skills preferably in Matlab or other similar programming languages - Knowledge of activated sludge models (ASM 1, 2d and 3) will be considered an extra qualification - Good English skills (spoken and written) - Interest to perform independent research |

| Fellow code: ESR 8 | |
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| Title of research project | Development of an enhanced benchmark system for Wastewater Treatment Plants |
| Host institution | Division of Industrial Electrical Engineering and Automation, Faculty of Engineering, University of Lund (Sweden) http://www.iea.lth.se (specific) http://www.lunduniversity.lu.se (general) Contact: Dr Ulf Jeppsson (ulf.jeppsson@iea.lth.se) |
| Brief description of individual research project | <p>The research objective is to develop a set of benchmark simulation models (BSMs) for control strategy development and evaluation of wastewater treatment systems. The BSMs will serve as a common software platform within the SANITAS project. ESRs 7, 8 and 9 will be working in parallel along two tracks, a bottom–up (BU) and a top–down (TD) approach. ESR 8 (BU) will focus on extending the existing the WWTP models by including new processes (pH, inorganic material and phosphorus removal in both activated sludge and anaerobic digestion), extended evaluation tools and novel plant–wide control strategies. The result will be a powerful and useful tool for the wastewater industry in Europe and open up significant new opportunities for educational purposes as well. The candidate will also undertake graduate education, by taking Ph.D. courses or in other forms.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May, 2012 (with possible extension of up to 12 months to complete a Swedish PhD degree) |
| Educational requirements | Candidates should have an MSc degree in chemical, |

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| | environmental, civil engineering or similar (academic exam corresponding to at least 240 ECTS, out of which at least 60 ECTS on advanced level). Courses/experience in mathematical modelling and control is an extra qualification. |
| Other specific requirements | <ul style="list-style-type: none"> - Knowledge of water/wastewater treatment technologies especially biological processes - Programming skills preferably in Matlab or other similar programming languages - Knowledge of activated sludge models (ASM 1, 2d and 3) will be considered an extra qualification - Good English skills (spoken and written) - Interest to perform independent research |

| Fellow code: ESR 9 | |
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| Title of research project | Practical application of models in UWS: Simulation-based scenario analysis for reducing carbon footprint, nitrite production and micropollutant discharge in UWS operation. |
| Host institution | Technical University of Denmark http://www.dtu.dk/English.aspx |
| Brief description of individual research project | The research objective is to develop a set of benchmark simulation models (BSMs) for control strategy development and evaluation of wastewater treatment systems. The BSMs will function as common software platform within the SANITAS project. ESR 7, 8 and 9 will be working in parallel along two tracks, a bottom-up (BU) and a top-down (TD) approach. ESR 9 (BU) will focus on: (1) extending the existing WWTP models by including new processes (occurrence, |

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| | <p>transport and fate of micropollutants, role of nitrite on nutrient removal processes and generation of CO₂ and other greenhouse gases); (2) extended evaluation tools; and (3) novel plant-wide control strategies. The result will be a powerful and useful tool for the wastewater industry in Europe and will open up significant new opportunities for educational purposes as well.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May, 2012 |
| Educational requirements | Candidates should have an MSc degree in chemical, environmental, civil engineering or similar. |
| Other specific requirements | <ul style="list-style-type: none"> - Knowledge of water / wastewater treatment technologies especially biological processes. - Programming skills preferably in Matlab or other similar programming language (C/ C++). - Knowledge of activated sludge models (ASM 1,2d and 3) will be considered an extra qualification - Good writing skills in English. - Interest to perform independent research. |

| Fellow code: ESR 10 | |
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| Title of research project | Improved modelling, design and control of granular sludge reactors in future energy-positive WWTPs |
| Host institution | Ghent University (Belgium) http://www.ugent.be/en Dept. of Biosystems Engineering Contact: prof. Eveline Volcke: eveline.volcke@ugent.be |
| Brief description of individual research project | The objective of this PhD research project is to optimize the design and control of granular sludge anammox reactors for innovative nitrogen removal |

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| | <p>from wastewater. This involves minimizing energy requirements, greenhouse gas (N₂O and CO₂) emissions and sludge production, while maintaining the required process efficiency at a reasonable cost. This goal will be achieved through numerical simulation, based on physical-based process models.</p> <p>More info? http://www.biosys.ugent.be/en/vacancies.htm and IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 36 months, starting on the 1 st of May 2012 |
| Educational requirements | MSc degree in a relevant discipline, such as Chemical or Environmental Engineering. |
| Other specific requirements | <ul style="list-style-type: none"> - Good knowledge of or a strong interest in mathematical modelling, numerical simulation, computer programming, environmental technology and/or process optimization. - Eagerness to learn and a critical spirit. - Ability to work independently but also ability to be a team player. - Good communication skills. |

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| Fellow code: ER1 | |
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| Title of research project | Decision support systems and qualitative modelling in UWS |
| Host institution | University of Girona (Spain) Contact: http://lequia.udg.es/ |
| Brief description of individual research project | <p>The research objective is to develop decision support systems and qualitative models for risk assessment of design and operational problems in UWS</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 18 months, starting on the 1 st of October 2012 |

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| Educational requirements | <ul style="list-style-type: none"> - Environmental engineering - Modelling of wastewater treatment systems |
| Other specific requirements | <ul style="list-style-type: none"> - Knowledge management - Knowledge-based systems |

| Fellow code: ER 2 | |
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| Title of research project | Integrated advanced technologies for water reuse. |
| Host institution | ACCIONA (Spain) http://www.accion.es/ |
| Brief description of individual research project | <p>The objective of the project is to evaluate experimentally different combinations of advanced water treatment technologies for water reuse including membrane bioreactors and reverse osmosis using an MBR/RO pilot plant located in Almuñécar (Granada, Spain). The fellow will study different filtration control systems for the MBR and the whole system will be evaluated in terms of energy requirements, membrane fouling and effluent quality for water reclamation. The studied technologies will be compared with conventional technologies for water reuse.</p> <p>Secondments: 3 months at University of Gent and 3 months at the Technical University of Denmark</p> |
| Duration of appointment | 24 months, starting on the 1 st of October 2012 |
| Educational requirements | <ul style="list-style-type: none"> - Degree in Engineering (preferably Chemical Engineering) or Environmental Sciences. - Background in wastewater treatment. - Knowledge in control systems is desirable. |
| Other specific requirements | <ul style="list-style-type: none"> - Strong technical and analytical skills. - Driving license. - Spanish will be a plus. - Communication abilities are welcome |

| Fellow code: ER 3 | |
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| Title of research project | Tool development for cost effective control strategies in UWS |
| Host institution | AQUAFIN (Belgium) http://www.aquafin.be |
| Brief description of individual research project | Development of a phenomenological tool for the assessment of emissions from sewer systems by predicting water quality of sewer overflows in combination with existing hydraulic models. Secondly, development of a robust tool for sensitivity analysis and cost optimisation of the integrated urban water system able to derive the most cost-effective parameters of the integrated UWS model by adaptation and optimisation of the control strategies at hand for sewer system and WWTP. More info? See IRP section at www.sanitas-itn.eu |
| Duration of appointment | 24 months, starting on the 1 st of May, 2012 |
| Educational requirements | Experience with modelling and matlab programming |
| Other specific requirements | Practical experience in modelling UWS forms a plus |

| Fellow code: ER 4 | |
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| Title of research project | Advanced research for water reuse systems and impact on receiving media. |
| Host institution | Yarqon River Authority http://www.yarqon.org.il/ Contact: david@yarqon.org.il |
| Brief description of individual research project | The research objective is to examine the feasibility of successful management of comprehensive and integrated river rehabilitation, including supplying water from the river to multiple type users as part of |

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| | <p>the master plan, involving 7 municipalities, at least 5 governmental ministries, public and governmental infrastructure companies and a river authority.</p> <p>This research requires knowledge of diverse issues and understanding the need of bridging between disciplines, governance, legal systems and stakeholders. The researcher will study the economic and environmental costs and benefits gained from implementing the Yarqon master plan, as well as future benefits from extending basin management to the entire basin.</p> <p>More info? See IRP section at www.sanitas-itn.eu</p> |
| Duration of appointment | 24 months, starting on the 1 st of October, 2012 |
| Educational requirements | Environmentalist with background in economics |
| Other specific requirements | Previous practical experience desirable. |