

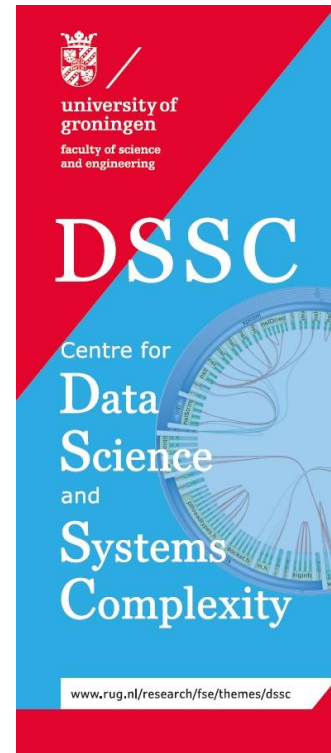
Call for proposals: PhD projects in Data Science and Systems Complexity

The Faculty of Science and Engineering at the University of Groningen offers **9 PhD scholarship positions for PhD projects within our research theme Data Science and System Complexity (DSSC)**. This document gives information about the research theme and the topics to which candidates can apply. For more information on the PhD scholarship positions that we offer and on how to apply, please see the vacancy text on the website of the University of Groningen.

DSSC Centre <https://www.rug.nl/research/fse/themes/dssc/>

The mission of the DSSC Centre (est. in 2015 at the Faculty of Science and Engineering) is to understand and design complex systems and processes through massive data. DSSC brings together more than 70 researchers from disciplines with an immediate interest in the handling of Big Data and Complexity (mathematics, statistics, computer science, artificial intelligence, engineering, astronomy, physics, bioinformatics) who address three broad research directions: Adaptive Models and Big Data; Complex Systems and Engineering; Advanced Instrumentation and Big Data.

The DSSC approaches Adaptive models and Big Data by connecting data and complexity science: our research hinges on the combination of statistics and computer science in statistical machine learning, on the preoccupation with explanatory models in statistics and on complex systems modelling as research focus. In Complex Systems and Engineering the DSSC experts do not only want to understand complex systems, but also get a grip on them to control and manage such systems. In Advanced Instrumentation and Big Data, the DSSC focuses on handling extremely faint signals, high precision and stability, cryogenic temperatures, high data volumes and high data transmission speeds for the design of complex instruments.



Topics and supervisors

Candidates are invited to apply for one of the following topics. In the second stage of the selection procedure, selected candidates will be invited to develop a research proposal in consultation with the supervisors mentioned.

Institute abbreviations:

BI: Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence

LT: Language Technology- Computational Linguistics, Faculty of Arts

ENTEG: Engineering and Technology Institute Groningen

ERIBA: European Research Institute for the Biology of Ageing

GRIP: Groningen Research Institute of Pharmacy

KI: Kapteyn Astronomical Institute

SRON: Netherlands Institute for Space Research

UMCG: University Medical Centre Groningen

ZIAM: Zernike Institute for Advanced Materials

1. From medical reports to visual data stories

Supervisors:

BI: Dr. Jiri Kosinka (j.kosinka@rug.nl); Dr. Fokkie Cnossen (f.cnossen@rug.nl)

UMCG: Dr. ir. Peter van Ooijen (p.m.a.van.ooijen@umcg.nl)

Disciplines & DSSC areas involved:

- computer science, artificial intelligence, medical informatics and radiology, human-computer interaction, cognitive psychology, visualisation, and big data processing, medical informatics
- [Adaptive Models and Big Data](#)

2. Port-based modeling and control of soft robots

Supervisors:

BI: Prof. dr. Raffaella Carloni (r.carloni@rug.nl); Prof. Dr. Arjan van der Schaft

(a.j.van.der.schaft@rug.nl)

Disciplines and DSSC areas involved:

- systems, control and applied analysis; robotics; artificial intelligence; mathematics
- [Complex Systems and Engineering](#)

3. Searching for Extremely Rare Objects in the Universe

Supervisors:

KI: Prof. dr. Leon Koopmans (koopmans@astro.rug.nl); Dr. Gijs Verdoes Kleijn

(g.a.verdoes.kleijn@rug.nl)

BI: Dr. Marco Wiering (m.a.wiering@rug.nl)

Disciplines and DSSC areas involved:

- machine learning, astronomy, deep convolutional neural networks, artificial intelligence
- [Adaptive Models and Big Data](#)

4. Faint object detection in multidimensional astronomical data

Supervisors:

BI: M.H.F. Wilkinson (m.h.f.wilkinson@rug.nl, m.h.f.wilkinson@gmail.com)

KI: Prof. dr. Reynier Peletier (peletier@astro.rug.nl)

Collab.: Dr. M. Grzegorzczak (m.a.grzegorzczak@rug.nl) (BI)

Disciplines and DSSC areas involved:

- computer science, machine learning, astronomy, statistics, stochastics, mathematics
- [Adaptive Models and Big Data](#)

5. Learning to model scientific quality with interpretable predictive models

Supervisors:

KI: Prof. dr. Edwin Valentijn (e.a.valentijn@rug.nl)

BI: Prof. dr. Lambert Schomaker (l.r.b.schomaker@rug.nl); Gideon Maillette de Buy

Wenniger (g.e.maillette.de.buij.wenniger@rug.nl)

Disciplines and DSSC areas involved:

- science of science, open science, FAIR, text mining, computer vision, astronomy, artificial intelligence
- [Adaptive Models and Big Data](#)

6. Machine Learning Applications for Hyperspectral Astronomical Images

Supervisors:

KI: Prof. dr. Floris van der Tak (F.F.S.van.der.Tak@sron.nl)

BI: Prof. dr. Nicolai Petkov (n.petkov@rug.nl); Prof. dr. Lambert Schomaker (l.r.b.schomaker@rug.nl)

Disciplines and DSSC areas involved:

- astronomical data analysis, machine learning, astronomical Instrumentation, computer science, artificial intelligence
- [Adaptive Models and Big Data](#); [Advanced Instrumentation and Big Data](#)

7. Developing a mathematical framework for time-series analysis algorithms

Supervisors:

BI: Dr. Marco Wiering (m.a.wiering@rug.nl); Dr. Alef Sterk (a.e.sterk@rug.nl); Prof. dr. Lambert Schomaker (l.r.b.schomaker@rug.nl)

Disciplines and DSSC areas involved:

- recurrent neural networks, dynamical systems, artificial intelligence, mathematics
- [Adaptive Models and Big Data](#)

8. Machine Learning analysis of big data in deep galaxy imaging surveys

Supervisors:

BI: Prof. dr. Michael Biehl (m.biehl@rug.nl); Dr. Estefania Talavera Martinez (e.talavera.martinez@rug.nl)

KI/SRON: Prof. dr. Lingyu Wang (L.Wang@sron.nl)

Disciplines and DSSC areas involved:

- astronomy, computer science, astroinformatics, machine learning, deep neural networks, image analysis, clustering and classification
- [Advanced Instrumentation and Big Data](#); [Adaptive Models and Big Data](#)

9. Coevolutionary dynamic networks

Supervisors:

ENTEG: Prof. dr. Ming Cao (m.cao@rug.nl ming.cao@gmail.com)

BI: Dr. Hildeberto Jardón Kojakhmetov (h.jardon.kojakhmetov@tum.de)

Disciplines and DSSC areas involved:

- Mathematics, engineering, dynamical systems
- [Complex Systems and Engineering](#)

10. Computational Design of Soft Robots

Supervisors:

BI: Prof. dr. Roel Verstappen (r.w.c.p.verstappen@rug.nl)

ZIAM: Prof. dr. Patrick Onck (p.r.onck@rug.nl)

Disciplines and DSSC areas involved:

- magneto-elastic modelling, numerical methods, complex dynamical systems, mathematics, computational physics, molecular dynamics
- [Complex Systems and Engineering](#)

11. Responsible processing of big natural language data

Supervisors:

Bl: Dr. Fatih Turkmen (f.turkmen@rug.nl); Prof. dr. Bart Verheij (bart.verheij@rug.nl)

LT: Dr. Arianna Bisazza (a.bisazza@rug.nl)

Disciplines and DSSC areas involved:

- natural language processing, information system design, artificial intelligence, computer science, computational linguistics, privacy engineering
- [Complex Systems and Engineering](#); [Adaptive Models and Big Data](#)

12. Machine learning for the detection of "filament-like" astronomical structures

Supervisors:

KI: Prof. dr. Reynier Peletier (peletier@astro.rug.nl)

Bl: Dr. Kerstin Bunte (K.Bunte@rug.nl)

Disciplines and DSSC areas involved:

- stellar population modelling, machine learning techniques for astronomical data, astronomy, computer science.
- [Adaptive Models and Big Data](#); [Advanced Instrumentation and Big Data](#)

13. Advanced modelling of astronomical images at radio-wavelengths

Supervisors:

KI: Dr. Andre Offringa (a.r.offringa@rug.nl); Prof. dr. Leon Koopmans (koopmans@astro.rug.nl)

Bl: Dr. Michael Wilkinson (m.h.f.wilkinson@gmail.com, m.h.f.wilkinson@rug.nl)

Disciplines and DSSC areas involved:

- compressive sensing techniques, astronomical data processing, radio-astronomical imaging / calibration algorithms, digital imaging techniques, reionization and interferometry, astronomy, computer science
- [Advanced Instrumentation and Big Data](#)

14. Component specifications for control system performance

Supervisors:

Bl: Dr. ir. Bart Besselink (b.besselink@rug.nl); Prof. dr. Arjan van der Schaft (a.j.van.der.schaft@rug.nl)

ENTEG: Dr. Ashish Cherukuri (a.k.cherukuri@rug.nl)

Disciplines and DSSC areas involved:

- interconnected engineering systems, specifications on dynamical systems, stochastic systems, mathematics, engineering.
- [Complex Systems and Engineering](#)

15. Distributed Multi-agent Learning for Engineering Applications

Supervisors:

ENTEG: Dr. Ashish Cherukuri (a.k.cherukuri@rug.nl); Prof. dr. Dario Bauso d.bauso@rug.nl

Bl: Dr. Marco Wiering (m.a.wiering@rug.nl)

Disciplines and DSSC areas involved:

- machine learning (imitation learning) for big data and systems and control (distributed algorithms and multiagent networks), engineering, artificial Intelligence.
- [Complex Systems and Engineering; Adaptive Models and Big Data](#)

16. Modelling gene variability to uncover dysregulated networks

Supervisors:

BI: Prof. dr. Marco Grzegorzczak (m.a.grzegorzczak@rug.nl);

GRIP: Prof. Dr. Peter Horvatovich (p.l.horvatovich@rug.nl)

ERIBA: Dr. Victor Guryev (v.guryev@umcg.nl)

Disciplines and DSSC areas involved:

- statistics, bioinformatics, RNA sequencing data, mathematics.
- [Advanced Instrumentation and Big Data](#)

17. Bayesian Inference and Mapping of the Cosmos

Supervisors:

BI: Prof. dr. Marco Grzegorzczak (m.a.grzegorzczak@rug.nl); Prof. dr. Tobias Muller (tobias.muller@rug.nl)

KI: Prof. dr. Rien van de Weygaert (weygaert@astro.rug.nl)

Disciplines and DSSC areas involved:

- statistical Bayesian inference techniques, cosmic structure formation, astronomy, mathematics.
- [Adaptive Models and Big Data](#)

18. Machine Learning for Renewable Energy Capture

Supervisors:

ENTEG: Prof. dr. Antonis Vakis (a.vakis@rug.nl); Prof. dr. Bayu Jayawardhana (b.jayawardhana@rug.nl)

BI: Dr. Kerstin Bunte (K.Bunte@rug.nl)

Disciplines and DSSC areas involved:

- numerical modeling, model reduction, machine learning, engineering, computer science
- [Complex Systems and Engineering](#)

19. Automatic identification of structures in biomedical mega-images

Supervisors:

BI: Dr. George Azzopardi (g.azzopardi@rug.nl);

UMCG: Prof. dr, Ben Giepmans (b.n.g.giepmans@umcg.nl)

Disciplines and DSSC areas involved:

- visual pattern recognition, biomedical sciences, nanotomey, computer science, medical sciences
- [Adaptive Models and Big Data](#)