Jobbnorge ID: 287685
Deadline: 31.10.2025
Website: http://www.ntnu.no
Scope: Fulltime
Duration: Fixed Term

The Department of Geosciences has a vacancy for a

PhD Candidate in Geothermal Drilling for Nordic conditions - IV-101/25

This is NTNU

NTNU is a broad-based university with a technical-scientific profile and a focus in professional education. The university is located in three cities with headquarters in Trondheim.

At NTNU, 9,000 employees and 43,000 students work to create knowledge for a better world.

You will find more information about working at NTNU and the application process here.

Video: https://youtu.be/Xt-yHCN5QS0

About the position

Are you motivated to take a step towards a doctorate and open up exciting career opportunities? As a PhD Candidate with us, you will work to achieve your doctorate, and at the same time gain valuable experience that qualifies you for a further career in higher education and research, in and outside academia.

The Department of Geosciences (IGV) has a vacancy for a full-time 100% position as a PhD Candidate.

Your immediate leader will be the Head of Department.

About the project

Technology development in geothermal energy and deep drilling has made great progress in recent years, especially in the US and Canada where pilot projects produce large amounts of energy, both heating and electricity production. The technological advances within cost-effective drilling have their starting point in the fracking industry, and other oil and gas industries.

Mainland Norway consists mostly of igneous and metamorphic rocks. This poses drilling technical challenges that differ from the sedimentary rocks on the shelf. Nevertheless, there is a lot of experience and technology to be gained from the Norwegian petroleum industry. The geothermal gradient is moderate, but a climate with large seasonal variations also provides opportunities to combine heating and cooling, deep drilling and seasonal heat storage (GeoThermos).

Energy security and emergency preparedness have become an increasingly important topic - not least to have systems for heating and industrial processes that are not very dependent on supplied electricity. Locally produced energy will also reduce the need for costly development of the national and regional power grid.

What the doctoral work will focus on will be developed in collaboration with the candidate and national and international industry players. Many aspects can possibly be addressed, e.g.:

- Drilling in hard crystalline rock in areas with low geothermal gradient
- The overall geothermal system and use must be described. Clarify which concepts may be relevant in Norway.
- Describe the research front and actively collaborate with the scientific community in Norway and internationally.
- The research topic will be focused on drilling - high-frequency hydraulic hammer, directional drilling and fishbone technology. What does it take to make drilling economically sustainable, i.e. how can the drilling speed be significantly increased?
- Explore and solve practical challenges in close collaboration with the leading drilling operators, equipment suppliers and industry associations in the Nordic countries - how to handle faults, swelling clays, rock stresses, drill wear (bit replacement).
- Collect and analyze existing and new data on drillability related to mineral content and degree of metamorphosis in crystalline rocks.
- Drilling optimization using machine learning, e.g. predicting rate of penetration (ROP) and wear.
- Investigate the possibilities in automation and robotization and the use of artificial intelligence.
- Electric drilling and other methods for reduced climate footprint.
- Combine deep wells with shallow seasonal heat storage (GeoTermos) and possibly short-term storage (accumulation in both water tanks and with phase change material - PCM).
- Digital twins of the system for real-time decisions, based on petroleum field experience.

- LCA and economic conciderations.
- Modeling and reservoir management using (and adapting) petroleum/CO2 storage tools for simulating flow and pressure response, as well as thermal storage. Also analyzing new and existing data and calibrating models.

Duties of the position

- Complete the doctoral education until obtaining a doctorate
- Carry out research of good quality within the framework described above
- Academic publications and popular science dissemination
- Participate in the research group Engineering Geology and Rock Mechanics
- Participate in international activities such as conferences and/or research stays at foreign educational institutions
- Teaching/tutoriols
- Other career-promoting work

Be prepared for changes to your work duties after employment.

Required selection criteria

Decide on what is to be defined as absolute qualification requirements and what is to be defined as desired qualifications (the latter are placed in the module below):

- You must have an academically relevant background within engineering geology, rock mechanics and/or geothermal energy.
- You must have a Master's degree in applied geosciences or equivalent. Your course of study must correspond to a five-year Norwegian course, where 120 credits have been obtained at master's level.
- You must have a strong academic background from your previous studies and have an average grade from your Master's degree study, or equivalent education, which is equal to B or better compared to NTNU's grading scale. If you do not have better grades from previous studies, you must have an equally good academic foundation. If you have a weaker grade background, you may be considered if you can document that you are particularly suitable for a PhD education.
- You must meet the requirements for admission to the Faculty of Engineering https://www.ntnu.edu/iv/doctoral-programme.
- For communication and co-operation with the Nordic industry players, good oral and written presentation skills in Norwegian or another Scandinavian language equivalent to level B2.
- Good oral and written presentation skills in English.
- Knowledge about the geological conditions in Norway and the Nordic countries.
- Personal suitability, strong collaboration and communication skills will be emphasized.

PLEASE NOTE: For detailed information about what the application must contain, see paragraph “About the application”.

The appointment is to be made in accordance with NTNUs guidelines for recruitment positions and Regulations for the degrees philosophiae doctor (ph.d.) and philosophiae doctor (ph.d.) in artistic development work at the Norwegian University of Science and Technology (NTNU)for general criteria for the position.

Personal characteristics

To complete a doctoral degree (PhD), it is important that you are able to:

- Work independently
- Work in a structured way, set goals and make plans to achieve them
- Present and discuss your research with other professionals
- Get involved and contribute constructively with feedback
- Work constructively under pressure or in the face of adversity
- Show curiosity and a strong motivation for the subject
- Analyze data, assess different perspectives and draw well-founded conclusions
- Be flexible and open to adjusting the plan for the project as needed

Emphasis will be placed on personal qualities.

We offer

Evaluate and remove/add what is relevant for the position.

- An exciting job with an important mission in society
- Developing tasks in a strong and international professional environment
- Career guidance and follow-up during the PhD period
- Open and inclusive working environment with committed colleagues
- Working capital that can be used to implement the project
- Favorable terms as a member of the Norwegian Public Service Pension Fund (SPK)

As a PhD Candidate at NTNU, you will have access to employee benefits.

Diversity

Diversity is a strength, and at NTNU we aim to be an employer that reflects the diversity in society and that makes use of the potential of the population's collective skills. Our vision is Knowledge for a better world and our values are creative, critical, constructive and respectful. We believe that an organization that is equal, diverse and gender-balanced is essential for us to achieve our goals.

We strive to attract employees with different skills, life experiences and perspectives to contribute to even better problem solving of our societal mission in research and education.

If you think this position is relevant and interesting, we encourage you to apply, regardless of gender, functional ability and cultural background, or whether you have been out of work for a period of time.

At NTNU we want to increase the proportion of women in scientific positions. We have a number of measures to promote equality. (delete if not applicable)

Salary and conditions

In the position of PhD Candidate, code 1017, your gross salary will normally be NOK 550 800,-per annum depending on qualifications and seniority. A 2% statutory contribution to the State Pension Fund is deducted from the salary.

The employment period is 3 years for the doctoral work in addition to one year of career promotion work. (A minimum of three work years of the total term period must be dedicated to doctoral work.)

For employment as a PhD Candidate, it is a prerequisite that you gain admission to the PhD programme Engineering in within three months of your employment contract start date, and that you participate in an organized doctoral programme throughout the period of employment.

As an employee at NTNU, it is important that you keep yourself up to date with academic and organizational changes and adapt to them.

For the necessary professional and social interaction, it is a prerequisite that you are physically present and available to the institution on a daily basis.

The appointment is carried out in accordance with the principles of the State Employees Act, and Export control(legislation that regulates the export of knowledge, technology and services). Candidates who, after assessment of the application and attachments, are considered to bein conflict with the criteria in the latter act, will not be able to be employed.

About the application

The attachments (including a description of your scientific work) must accompany the application as these documents form the basis of the application assessment. The documents must be in Norwegian/a Scandinavian language or English.

Please note: the application will only be assessed on the basis of the information we have received by the application deadline. Therefore, make sure that your application clearly shows how your skills and experience meet the criteria described above. The application and all attachments must be sent electronically via Jobbnorge.no. If you are invited to an interview, you must bring certified copies of certificates and diplomas upon request.

The application must include:

- Transcripts and diplomas for Bachelor's and Master's degrees
- CV
- Copy of Master's thesis. If you have recently submitted your Master's thesis, you can attach a draft of the thesis. Documentation of a completed Master's degree must be presented before taking up the position.
- Project outline containing proposals for an overall description of research questions, theoretical perspectives, methodological design for the project and progress plan (maximum 1500 words/4 pages)
- Short letter of motivation (400 words/1 page)
- Possibly publications etc. other relevant research work
- Possibly certificates
- Names and contact information of three relevant referees

If all, or parts, of your education has been taken abroad, we also ask you to attach documentation of the scope and quality of your entire education, both Bachelor's and Master's education, in addition to other higher education. If your institution uses “diploma supplement” (normal for most European institutions), you must attach this. A description of the documentation required can also be found here. If you already have a statement from Norwegian Directorate for Higher Education and Skills (HK-dir), please attach this as well.

Joint work will be considered. If it is difficult to identify your contribution to joint work, you must attach a brief description of your participation.

When assessing the best qualified, we emphasize necessary qualifications such as education, experience and personal suitability. Motivation for the position, ambitions ,and potential for research will also count when assessing the candidates.

NTNU recognizes a wide range of academic contributions and has committed itself to The San Francisco Declaration on Research Assessment and CoARA (responsible assessment of research and recognition of a greater breadth of academic contributions in accordance with NTNU's social mission).

General information

A public list of applicants with name, age, job title and municipality of residence is prepared after the application deadline. If you wish to be exempt from entry on the public applicant list, this must be justified. Assessment will be made in accordance with current legislation. You will be notified if the exemption is not granted.

If you think this position looks interesting and in line with your qualifications, you are welcome to apply.

If you have any questions about the position, please contact Research Group leader Professor Bjørn Frengstad, +47 97 67 07 67, bjorn.frengstad@ntnu.no. If you have any questions about the recruitment process, please contact HR Senior Advisor Eli Meistad, eli.meistad@ntnu.no.

Application deadline: 31.10.2025

For practical information about working at NTNU, please visit this webpage.

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the tech capital of Norway with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

NTNU - knowledge for a better world

NTNU - knowledge for a better world

The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Geosciences

We conduct teaching and research related to management of Earth's geological resources. Norway's rich resources of wind, water, oil, gas and minerals have been and are essential to the country's prosperity, and will continue to be in the future. The Department plays a key role in the development of technology and the education of graduates who enable value creation based on our natural resources. The Department of Geosciences is one of eight departments in the Faculty of Engineering.

Additional information

Contact persons:

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Place of service:

S. P. Andersens vei 15A 7491 Trondheim (Trondheim Municipality)