**Jobbnorge ID:** 215547
**Deadline:** 1/7/2022
**Website:** http://www.ntnu.no
**Scope:** Fulltime
**Duration:** Temporary

The Department of Geoscience and Petroleum has a vacancy for a

# PhD position in Mining Engineering - IV-248/21

## 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 42,000 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

## Research Collaboration in Sustainability

In 2015, the 2030 agenda with the 17 sustainability goals was adopted by all UN member states. The sustainability goals see the environment, economy and social development in context. The time horizon for necessary changes is short, and it is challenging to combine different considerations without conflicts of objectives and unintended consequences of measures.

NTNU is now announcing 43 individual PhD positions that will contribute to a greater understanding of system effects, societal changes and conflicts of interest related to the sustainability challenges. These positions are divided into 9 interdisciplinary projects with mainly 4-7 PhD positions in each project. (https://www.ntnu.no/sustainability/calls)

In this position, the candidate is expected to cooperate with the other PhD students in the project TripleDeep - The Deep Dilemmas: Deep Sea Mining for the new Deep Transition (https://www.ntnu.no/sustainability/calls/deep-sea-mining-dilemmas-by-tripledeep)

## About the position

We are looking for a PhD candidate in mining method selection for Deep Sea Mining operations. The appointment has a duration of three years with the possibility of one additional year of compulsory work (a decision of 3 or 4 years is made in connection with the recommendation and offer, after assessment of whether compulsory work is suitable for the relevant candidate). The appointment is financed by NTNU through its call for interdisciplinary research collaboration in sustainability.

The position is embedded into the Mineral production group at Department of Geoscience and Petroleum (IGP), NTNU Campus Trondheim and attached to an interdisciplinary research project: TripleDeep - The Deep Dilemmas: Deep Sea Mining for the new Deep Transition.

The Mineral Production and HSE Research Group at IGP covers the whole mining value chain from resource geology and exploration to final products. It contributes to research and higher education within NTNUs Strategic Focus Area on the ocean.

For a position as a PhD Candidate, the goal is a completed doctoral education up to an obtained doctoral degree. The position is connected to the PhD program at the Faculty of Engineering Science.

The candidate will be supervised by project leader associate professor Steinar Ellefmo.

#### Project description

The deep ocean floor contains vast deposits of minerals that are necessary in renewable energy technologies. These minerals are expected to be in high demand due to the de-carbonization of the global economy and the transition to a net-zero economy. But while the “blue minerals” may hold the key to a greener future, mining the deep seas raises many questions and dilemmas. Can the minerals be mined without causing massive and irreparable harm to the unique ecology of the deep oceans? Who will be allowed to exploit these minerals, and on what conditions? How can conflicts over rich deposits be avoided? What rules and incentives are needed to attract responsible investors that can pay for the development of the necessary technology? Is it worthwhile to destroy unique and largely unknown habitats in the deep seas in order to address the climate crisis?

The primary objective of the TripleDeep project is to investigate whether Deep Sea Mining can provide a new source of critically important minerals in a sustainable manner. To do so we must address significant knowledge gaps about the political, economic, technological and ecological dimensions of deep sea mining, and particularly how they interact with each other. The TripleDeep project group consist of an inter-disciplinary team, bringing together historians, marine biologists, economists and engineers.

The PhD position Deep Sea Mining Method Selection in the presence of Ecosystem Uncertainty will on the dilemma of whether to produce or preserve and how a deposit with certain geological and ecological characteristics and properties could be mined to minimize the environmental impact. The aim is to develop a multidimensional framework for mining methods selection.

You will report to Head of Department.

## Duties of the position

The TripleDeep project aims to achieve integrated interdisciplinary cooperation of high quality and according to international standards. As a PhD candidate you will be part of this research project consisting of 4 PhD candidates and 4 regular academic staff. Each PhD-candidate will have a co-supervisor from another discipline within the project group.

Therefore, the candidate is expected to

- Do an in-depth literature study to understand the value chain of deep-sea mining and potential environmental impacts
- Given relevant framework conditions, identify an interdisciplinary set of key factors decisive in the evaluation of preferred mining methods
- Develop a modelling and simulation framework that can simulate and quantify the performance of a subset of available mining systems
- Make suggestions on improvements on available and suggested mining systems that increase their performance
- Collaborate with the other PhD candidates within TripleDeep
- Participate in regular project workshops
- Contribute to joint project publications

## Required selection criteria

- You must have a professionally relevant background in mining- or marine engineering or marine operations
- Your education must correspond to a five-year Norwegian degree programme, where 120 credits are obtained at master's level
- You must have a strong academic background from your previous studies and an average grade from the master's degree program, or equivalent education, which is equal to B or better compared with NTNU's grading scale. If you do not have letter grades from previous studies, you must have an equally good academic basis. If you have a weaker grade background, you may be assessed if you can document that you are particularly suitable for a PhD education.
- You must meet the requirements for admission to the faculty's doctoral program (https://www.ntnu.edu/iv/doctoral-programme)
- Have a quantitative mindset and strong modelling and simulation capabilities (e.g., discrete event simulation)
- Have experience in the use of R, Matlab or similar modelling and simulation tools
- Proven good written and oral English communication skills
- Creative, with a strong ability to work towards positive solutions

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants and Regulations concerning the degrees of Philosophiae Doctor (PhD) and Philosodophiae Doctor (PhD) in artistic research national guidelines for appointment as PhD, post doctor and research assistant

## Preferred selection criteria

- Solid and documented disciplinary skills
- Documented practical experience in one or more of the required disciplines
- Background or experience in more than one of the project disciplines (history, economics, engineering, biology) will be considered an advantage
- Good written and oral English and Norwegian language skills

## Personal characteristics

- Enjoy working in a team-based environment but also able to conduct independent research activity and thinking.
- Creative, with a problem-solving attitude
- An inner motivation to make a difference
- Inquisitive nature and enjoy cross-disciplinary challenges.
- Good social skills that will benefit the work environment

## We offer

- exciting and stimulating tasks in a strong international academic environment
- an open and inclusive work environment with dedicated colleagues
- favourable terms in the Norwegian Public Service Pension Fund
- employee benefits

## Salary and conditions

PhD candidates are remunerated in code 1017, and are normally remunerated at gross from NOK 491 200 per annum before tax, depending on qualifications and seniority. From the salary, 2% is deducted as a contribution to the Norwegian Public Service Pension Fund.

The period of employment is 3 years, or 4 years with 25 % of compulsory work (a decision of 3 or 4 years is made in connection with the recommendation and offer, after assessment of whether compulsory work is suitable for the relevant candidate).

Appointment to a PhD position requires that you are admitted to the PhD programme in Engineering (https://www.ntnu.edu/iv/doctoral-programme) within three months of employment, and that you participate in an organized PhD programme during the employment period.

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The engagement is to be made in accordance with the regulations in force concerning State Employees and Civil Servants, and the acts relating to Control of the Export of Strategic Goods, Services and Technology. Candidates who by assessment of the application and attachment are seen to conflict with the criteria in the latter law will be prohibited from recruitment to NTNU. After the appointment you must assume that there may be changes in the area of work.

The position is subject to external funding.

It is a prerequisite you can be present at and accessible to the institution daily.

## About the application

The application and supporting documentation to be used as the basis for the assessment must be in English.

Publications and other scientific work must follow the application. Please note that applications are only evaluated based on the information available on the application deadline. You should ensure that your application shows clearly how your skills and experience meet the criteria which are set out above.

The application must include:

- CV, certificates and diplomas
- Transcripts and diplomas for bachelor's and master's degrees. If you have not completed the master's degree, you must submit a confirmation that the master's thesis has been submitted.
- A copy of the master's thesis. If you recently have 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.
- A motivation letter (1-2 pages), describing the relevance of your disciplinary background, your interest in the project, and how you would approach the given topic.
- Name and address of three referees
- If you have publications or other relevant research work

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. Description of the documentation required can be found here. If you already have a statement from NOKUT, please attach this as well.

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

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal and interpersonal qualities. Motivation, ambitions, and potential will also count in the assessment of the candidates.

NTNU is committed to following evaluation criteria for research quality according to The San Francisco Declaration on Research Assessment - DORA.

## General information

Working at NTNU

A good work environment is characterized by diversity. We encourage qualified candidates to apply, regardless of their gender, functional capacity or cultural background.

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**The city of Trondheim** is a modern European city with a rich cultural scene. Trondheim is the innovation 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.

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As an employee at NTNU, you must at all times adhere to the changes that the development in the subject entails and the organizational changes that are adopted.

In accordance with The Public Information Act (Offentleglova), your name, age, position and municipality may be made public even if you have requested not to have your name entered on the list of applicants.

If you have any questions about the position, please contact Associate Professor Steinar Ellefmo, Department of Geoscience and Petroleum, telephone +47 905 07 125, e-mail steinar.ellefmo@ntnu.no.

If you have any questions about the recruitment process, please contact Anne-Lise Brekken, Department of Geoscience and Petroleum, e-mail: anne.lise brekken@ntnu.no.

Please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates. Applications submitted elsewhere will not be considered. Diploma Supplement is required to attach for European Master Diplomas outside Norway. Chinese applicants are required to provide confirmation of Master Diploma from China Credentials Verification (CHSI).

If you are invited for interview you must include certified copies of transcripts and reference letters. Please refer to the application number IV-248/21 when applying.

**Application deadline: 07.01.2022**

## 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 Geoscience and Petroleum**

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 Geoscience and Petroleum is one of eight departments in the Faculty of Engineering.

## Additional information

### Place of service:

Department of Geoscience and Petroleum 7491 Trondheim (Trondheim Municipality)