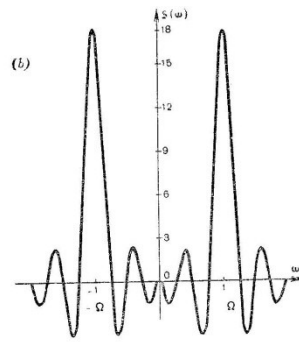# GeoNeurale

announces

Advanced Mathematical Methods for Geoscientists

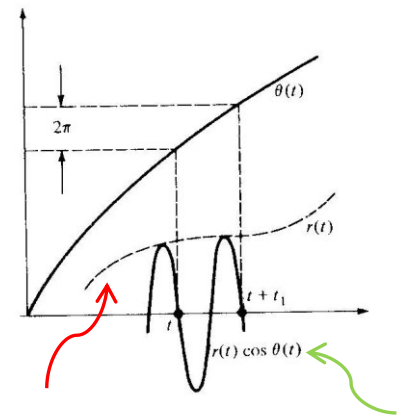### *Harald Friedrich*

8 – 11   October 2012
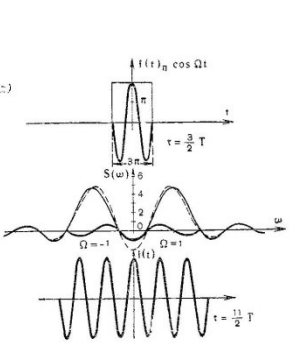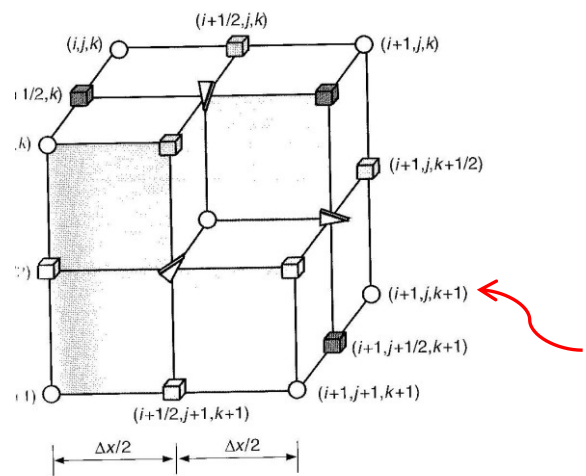
Munich

3D Seismic Imaging Concepts and Applications

MUNICH

at the

GATE – Garchinger Technologie und Gründerzentrum

8 – 11   October   2012

3 DAYS COURSE

INSTRUCTOR: Harald Friedrich

LEVEL: Advanced

AUDIENCE: Researchers, Seismic Processing Specialists, Imaging Specialists, Interpreters,
Geophysicists, Petrophysicists, Geologists, Geostatistics Specialists, Reservoir
Engineers.

COURSE FEES: 2450 Euro + VAT (19%)

REGISTRATION DEADLINE : 20 September 2012

ONLINE REGISTRATION: www.GeoNeurale.com

gate

GeoNeurale Office and Training Location

at the Munich-Garching Research Center

TUM

Campus Garching

gate Garchinger Technologie-
und Gründerzentrum GmbH
Lichtenbergstr. 8
85478 Garching b. München

gate

B11

Chemie

P P

P

Am Coulombwall

P

Physik

Lichtenbergstr.

Mensa

P

James-Franck Str.

Neutronenquelle

Maschinenbau

Freisinger Landstr.
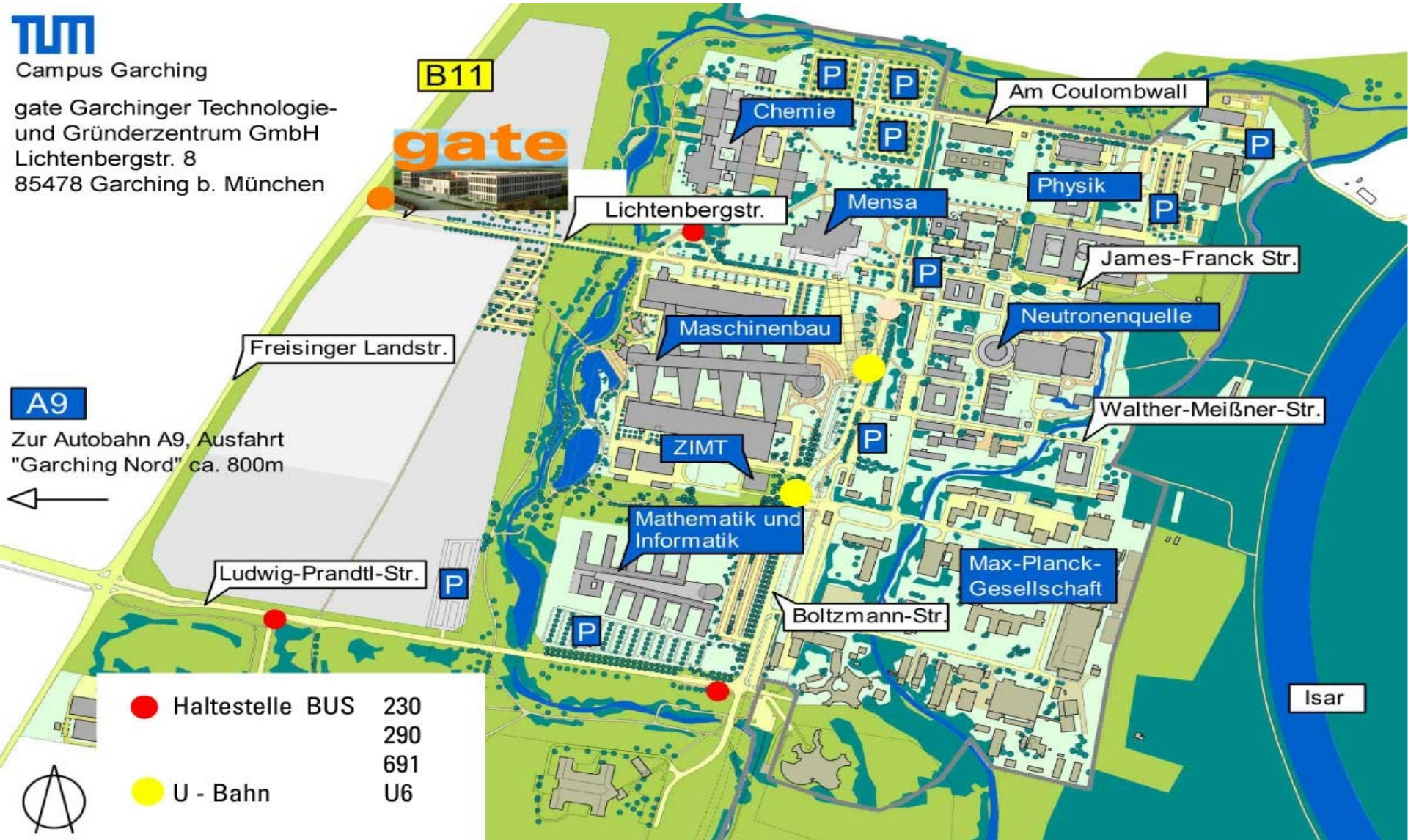
A9

Zur Autobahn A9, Ausfahrt
"Garching Nord" ca. 800m

ZIMT

P

Walther-Meißner-Str.

Mathematik und
Informatik

Max-Planck-
Gesellschaft

Ludwig-Prandtl-Str.

P

Boltzmann-Str.

P

Isar

	Haltestelle BUS	230
		290
		691
	U - Bahn	U6

Advanced Mathematical Methods for Geoscientists

NEED A REFRESHMENT ?

Geoscientists, Geophysicists, Petrophysicists, Reservoir Engineers, Geologists, Researchers and Professionals of the oil exploration industry are daily confronted with complex processing and interpretation problems.

Routine processing and interpretation programs on one side made the operations quicker, exact and statistically reliable. On the other hand they bound the geoscientist to a limited number of workflows and solutions that can not always satisfy the solution requirements of specific problems and inhibit flexibility in the logical intervention of the interpreter.

In many cases it can happen that the computer machine ist taking over the logical task of the processing, interpretation or modeling specialist.

In this situation the scientist gradually loses contact with the intrinsic logic of the processing/interpretation/simulation workflow.

This is like saying that the scientist is slowly becoming an inut/ output operator for complex programs that consist of hidden black-box systems and therefore increasingly elude the scientific control of the user.

GeoNeurale has, since its beginning, identified such problems.

GeoNeurale as first oil and gas education center introduced a theoretical and applicative Neural Networks course to help the user to identify the most efficient Neural models for the petrophysical estimation.

Since then GeoNeurale decided to pursue this directive for the institution of courses to help and develop the logical and decisional control of the scientist over the interpretation process.

The scientist needs a continuous training to review and update the logical tasks of his work and take the control over his interaction with the processing/interpretation programs.

Prof. Friedrich is organizing this course of Mathematical Methods for Geoscientists including theoretical and practical applications.

The program contains not only a review of university theory but also new methods and mathematical applications that can help the geoscientist to increase his efficiency and improve his creativity and interpretation skills.

It is a new approach for geoscientists where the algebraic logic and notations are simultaneously redirected in the praxis.

Algorithms and complex notations are translated into numerical logic and the physical problem is directly addressed within the mathematical context.

Numerical applications with the software "Mathematica" are a constant component of each chapter.

This is not only a refresher course. It is a fully new approach of new logical methodologies in the transition from the Theoretical Mathematics to the Physical Application with the goal of adding and improving control, efficiency, flexibility and creativity on the interpretation and processing workflows.

PROGRAM

1. Linear Algebra

Linear equations, vector spaces, tensor calculus, metrics

2. Calculus

Differentiation and integration in multidimensional spaces,

ordinary differential equations,

partial differential equations,

integral equations,

wave equations,

transport equations,

integral transforms,

methods of solution, e.g. Green's Function techniques,

finite elements,

Monte Carlo

3. Theory of Complex Functions

Analytical functions,

series expansions,

conformal mappings

4. Statistics

mean values, sampling, weighting, variance, correlations

5. Data Processing

Elements of Signal Analysis, Binary gain mathematics

 The mathematical theory is complemented with applications suitable for geoscientists all along, i.e. at every stage,

including numerical applications and visualizations based on the software "Mathematica".

OPEN PROGRAM

A topics list for open discussion that the geoscientists can propose as a special topic before or during the course

-Vector spaces
-Tensors
- Eigenvalues
-Differential and integral equations for geoscientists
-Complex functions
-Theory of elasticity
-Seismic waves (Spectra, Energy and Attributes)
-Wave equations: linear,spherical,cilindrical, exponential forms
-Laplace transforms
-Fourier transforms
-Z-transforms
-Spectra
-Transfer functions
-Covariance analysis
-Sampling rate and alias
-Convolution/deconvolution
-Filters
-Wavelets (zero phase/ minimum phase)
-Dirac Function
-Heaviside Function
-Hilbert space and Hilbert transform
-Green Function
- Bessel function
- Gamma Function
-Applications in geophysical problems
-Modeling, similarity and simulation theory
-Finite elements models
-Introduction to the Fractal Theory

Harald Friedrich

Prof. Dr. Harald Friedrich

Associate Professor for Theoretical Physics at the Technical University Munich.

The research of Prof. Friedrich focuses on atomic systems, in particular in the anticlassical, extreme quantum regime which is important for current experiments involving ultra-cold atoms and molecules.
Special topics are quantum reflection, elastic scattering, resonances and quantization in weakly bound systems.
Friedrich (born 1947 in Berlin) grew up in Australia and studied Physics in Kiel and Freiburg in Germany. He received the degree of Dr.rer.nat. at the University of Munster and worked as a post-doc at the University of Oxford and at the California Institute of Technology. He was appointed Associate Professor of Theoretical Physics at the Technical University Munich in 1987.
He has worked as visiting scientist at the Harvard-Smithsonian Center for Astrophysics and at the Australian National University in Canberra.
Since 2011 in charge of the course "Advanced Mathematical Methods for Geoscientists" at GeoNeurale.
He is author of a textbook on "Theoretical Atomic Physics", which was published originally in German in 1990; the third English edition was published in 2006. In 2008 he was honoured as "Outstanding Referee" for Journals of the American Physical Society.

Books and Papers
Friedrich H,: "Theoretical Atomic Physics", Springer-Verlag, Berlin, Heidelberg, New York, 3rd Ed. 2006.
Friedrich H, Trost J: "Working with WKB waves far from the semiclassical limit". *Physics Reports*. 2004; 397: 359–449.
Friedrich H, Jacoby G, Meister CG: "Quantum reflection by Casimir-van der Waals potential tails". *Physical Review A.* 2002; 65: 032902.
Friedrich H, Eckhardt B, Eds., Classical, Semiclassical and Quantum Dynamics in Atoms, *Lecture Notes in Physics* Vol. 485, Springer-Verlag, Berlin Heidelberg New York, 1997
Friedrich H, Wintgen D: "The hydrogen atom in a uniform magnetic field — an example of chaos". *Physics Reports*. 1989; 183: 37–79.
Buck B, Friedrich H, Wheatley C: "Local potential models for the scattering of complex nuclei", *Nuclear Physics.* 1977; A275: 246–268.

Other Papers and Research of Prof. Friedrich
http://einrichtungen.ph.tum.de/T30a/

www.GeoNeurale.com

Registration Details

- Course fee: 2450 Euro + VAT (19%)
- Registration deadline : 20 September 2012

Payment and Registration

Tuition fees are due and payable in Euro upon enrollment in the course by bank transfer to the bank account given below unless another payment form is agreed

 Unless otherwise indicated, the payment should be received before the date specified in the invoice as payment term to make the enrollment effective.

To register to the course please fill in the registration form and fax or email it along with the confirmation of your bank transfer to:

GeoNeurale

Am Nymphenbad 8

81245 Munich

T +49 89 8969 1118

F +49 89 8969 1117

ONLINE REGISTRATION: www.GeoNeurale.com

Bank Information: Genossenschaftsbank EG Muenchen

Bank Account N. 519618   BIC – Code :   GENODEF 1M07

BLZ 701 694 64   IBAN :   DE19 7016 9464 0000 5196 18

Please indicate your name and the purpose: "Advanced Mathematical Methods for Geoscientists - course fees".

www.GeoNeurale.com

Provisions

Tuition fees are due and payable in Euro upon enrollment in the course. Unless otherwise indicated, fees do not include student travel costs and living expenses.

Payments are also accepted via personal or company check, traveler's check, credit card, and Company Purchase Orders.

Cancellations by Participant:

All cancellation are subject to a 100 Euro non-refundable cancellation fee.

Cancellation have to be notified to our office, at least 30 days prior to the course start date to receive a refund (less the 100 Euro cancellation fee).

If the participants are unable to cancel prior to the 32 days notification date, they may substitute another person at their place in a course by notifying us prior to the course start date.

Course Cancellations:

GeoNeurale reserves the right to cancel the courses if necessary. The decision to cancel a course is made at least two weeks prior to the course start date. If a course is cancelled, the participant will receive a full reimbursement of the tuition fees (but not of the plane ticket or hotel expenses or any other costs), or will be enrolled in another course upon his decision (the cost of the original course will be applied to the cost of the replacement course).

GeoNeurale can not be responsible for any penalties incurred for cancellation or change of airline or hotel reservations .

Refunds:

GeoNeurale will promptly remit all refunds of tuition fees due to cancellations or annullment (less any appropriate non-refundable cancellation fee) within 30 days of the course cancellation.

Force Majeure:

GeoNeurale can not be responsible for cancellations due to "force majeure" events : airplane or airport strikes, emergency situations, natural catastrophes and all situations and incidents independent or outside the human control that can delay or cancel the course. In case of such events related cancellations the course tuition fees will be refunded to the client .

Geoneurale is not responsible for any delay or absence caused by the training instructor or training instructor company for reasons which are independent or out of the control of GeoNeurale s decisions.

AGREEMENT: Upon enrollment all parts accept the above mentioned provisions. The above specified provisions shall regulate the agreement between GeoNeurale and the participant and the participant company and will enter into force upon enrollment.

REGISTRATION FORM

Advanced Mathematical Methods for Geoscientists

Munich, 8 - 11 October 2012

Course Fee: 2450 Euro + VAT (19%)

Name:

Company:

Address:

Job Title:

Phone:

Fax:

Email:

SIGNATURE: _____

www.GeoNeurale.com

INFORMATIONS, HOTELS, MAPS, LINKS

TRAINING LOCATION – RESEARCH CENTER

http://www.geoneurale.com/documents/GATE-Y7.pdf

GATE GARCHING

http://www.geoneurale.com/documents/GATE-Y6.pdf

MAP MUNICH-GARCHING

http://www.muenchen.city-map.de/city/db/130208000001/14269/Garching.html

MUNICH INFO and MAP MUNICH CENTRAL

http://www.muenchen.de/home/60093/Homepage.html

MAP MUNICH UNDERGROUND

http://www.mvv-muenchen.de/web4archiv/objects/download/3/netz1207englisch.pdf

HOTELS NEAR GeoNeurale

http://www.geoneurale.com/documents/HOTELS-GARCHING.pdf

BAVARIA INFO

http://www.geoneurale.com/documents/Around-Munich-Info.pdf
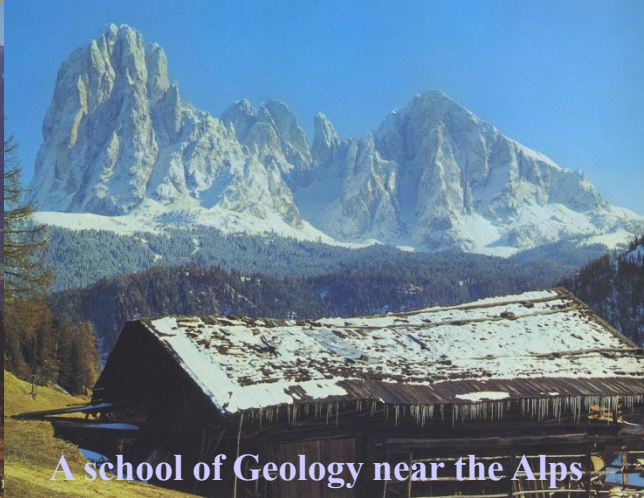
A school of Geology near the Alps