Mathematics for Natural Sciences
(Winter term 2014/2015)
Information sheet

Lecturer: Alessandro Michelangeli (Mathematics Institut, LMU Munich)

Tutors: Philipp Geiger, Markus Noeth, Patrick Wilke (TMP Programme, Munich)

Course website: http://www.mathematik.uni-muenchen.de/~michel/WS14_MNW.html

Please check this website on a regular basis for possible changes of schedule and any other relevant information on the course and the exam.

Organisation: one 2h lecture per week, plus one 2h "tutorial+homework session" per week. Participation is not mandatory, but recommended. We will run three *identical* tutorial+homework sessions per week, students are supposed to choose *one* by registering at the beginning of the term. In the lecture: theory and examples. In tutorials: further examples, discussion of homework, further on-the-fly exercises, question time. Each week after the lecture a homework sheet will be posted online; a selection of the homework exercises will be discussed in the tutorials of the week after. The homework is not marked and does not contribute the final mark; it is an opportunity that we recommend for the preparation for the final exam.

Weekly schedule:

LECTURE:	Monday 14:15 – 16:00	lecture room B-138
TUTORIAL/HOMEWORK SESSIONS:		
SESSION A	Monday 16:15 – 18:00	lecture room B-252
SESSION B	Wednesday 8:15 – 10:00	lecture room B-252
SESSION C	Wednesday 14:15 – 16:00	lecture room B-004

Tutorials will start in the second week of the term, namely on Monday 13 October (tutorial A) and Wednesday 15 October (tutorials B and C).

Registration: please sign in **within the first week of the course** at the **registration link** displayed on the course website.

Final exam *(Endklausur)*: Saturday 31 January, 8:30 – 11:30 am, in lecture room B-004 and B-005, Theresienstr. 39.

Makeup exam (*Nachholklausur*): Saturday 18 April, 8:30 – 11:30 am, in lecture room B-004 and B-005, Theresienstr. 39. Date and time to be confirmed! (Check the course website.) The makeup exam is both for who fails or misses the January final exam and for who passes it and wants to improve the mark (the best mark between the two exams will be taken).

Exam features: In compliance with the official exam regulations (*Prüfungsordnung der Ludwig-Maximilians-Universität München für den gemeinsamen Bachelorstudiengang Geowissenschaften, 2013*), the exam will consist of a 90 min multiple choice written test (Mehrfachauswahlaufgaben) probing the candidates *only* on the material discussed in the lectures. All practical details on the structure of the final exam will be posted soon on the course website.

Tentative content of the course:

1. **Numbers** (*2 weeks*). Natural, integer, and rational numbers. Decimal fractions and real numbers. Ordering. Max, Min, Sup, Inf, upper/lower bound. Powers and roots. Binomial coefficient.

2. **Sequences and series** (3 *weeks*). Sequences of numbers. Convergence and convergence criteria. Applications of sequences. Series. Harmonic and geometric series. Convergence criteria for series. Power and log.

3. **Funktionen** (3 *weeks*). Functions, domain, range. Graphic representation. Monotony. Elementary functions (polynomial, exp, log, trigonometrisc functions). Continuity.

4. **Differential calculus** (3 *weeks*). Differentiability. Monotonicity and convexity. Differentiation rules (product and quotient rule, chain rule, derivative of the inverse function, derivative of elementary functions). Local extrema. Graph sketching. Rules of de l'Hospital. Taylor series. Newton method. Differential equations (growth equations, oscillation equations).

5. **Integral calculus** (3 *weeks*). The definite integral: integrability and properties of the integral. Indefinite integral, primitive function. Fundamental Theorem of Calculus. Integration methods (substitution, integration by parts, partial fractions).

Weekly diary: an informal weekly diary with all the topics actually discussed in class will be kept updated on the course webpage.

Literature: Any of the following textbooks (the material of this course is completely standard):

N. Hermann, *Mathematik für Naturwissenschaftler.*
L. Papula, *Mathematik für Ingenieure und Naturwissenschaftler*.
W. Merz, P. Knabner, *Mathematik für Ingenieure und Naturwissenschaftler.*
H. Pruscha, D. Rost, *Mathematik für Naturwissenschaftler*.

Office hours (*Sprechstunde*):

Lecturer's office hours: by appointment per email (michel@math.lmu.de)
Tutors' office hours: by appointment at the end of your tutor's tutorial
Office hours without appointment cannot be guaranteed.