

The University of Sheffield

School of Mathematics & Statistics



Study in Europe



Guidance Notes

These are a few notes about going abroad to study in France and Germany and are intended to supplement the information given to you during the MLT Centre's Placement Module. Also included is a basic vocabulary of words encountered in mathematics lectures. These have been provided by those who have been to our various partners in recent years. Suggestions for additions (both to things to take and to the vocabulary, especially commonly used abbreviations) would be most welcome.

The level of organisation varies widely amongst our partners, particularly with regard to methods for obtaining accommodation and to registration procedures. There is also considerable variation in the amount of information sent to you by the University to which you are going. In fact this ranges from absolutely nothing at all to very detailed forms requiring advanced language skills in officialese. Consequently it is difficult to give general overall guidance on courses or accommodation procedures etc and it is necessary to talk with the particular Study in Europe Tutor who handles matters relating to the particular University abroad. You should maintain regular email contact with both him and your personal tutor whilst abroad (at least every three or four weeks). Many of our partners also provide excellent web pages with specific guidance for International Students and you should look at these first.

Further, there are general differences between what is required in France and Germany — broadly French bureaucracy is more intense, you need much more paperwork and you can queue for hours. A frequent comment from those who have experienced the French 'system' is that they encounter difficulties such as not being able to get one form without obtaining an authorization from somewhere else but then discovering that to get the authorization the first form is required beforehand. Other common difficulties (in both France and Germany) include discovering that crucial offices are only open at very restricted and inconvenient times (e.g. for only one hour in the week, not necessarily the same hour each week). Check opening times (*les heures d'ouverture* / *Sprechzeiten*) carefully. Patience and persistence are needed.

Some partner institutions will require you to register and attend the same number of courses as their own level 3 or 4 students. If this is the requirement then you have to follow this and it is indeed the technical regulation under the Erasmus scheme. However, our recommendation is that a sensible load is about 80% of the usual load together with an additional language course (if available). This is the recommendation given to incoming Erasmus students to Sheffield though they must actually register for the full load of 60 Sheffield credits per semester.

As regards courses, general advice is do not be persuaded by French or German professors to do courses which are too advanced. In both France and Germany, in Pure Mathematics you should do first year courses. Do not believe French or German professors who tell you that yes of course you will know enough to take Analysis 2 or 3. In common with almost all UK Universities, we do not teach the sort of analysis in Sheffield that is routine in year 1 (and even in the last few years of school) in France and Germany. Syllabuses and course material can look deceptively familiar and simple. You may think you have done similar material before and answered identical questions satisfactorily in Sheffield but in France (especially) the answers may be different — formal proofs of things which would be regarded in Sheffield as unnecessary are expected. Generally, this is not true of Statistics courses and if you have done Statistics in Sheffield then you should try second or perhaps higher level statistics courses in France or Germany. Courses with titles such as Probability or Stochastics may be very mathematical in which case stick to level 1, but level 2 may be accessible in some institutions.

You are strongly advised to take a language course whilst abroad if this is possible (these may not be available in some of our partners, in France in particular). If you have not been able to take a language course when away then you may take up to twenty credits from MLT Centre courses in year four without affecting the availability of an unrestricted module. Thus you could take up to forty credits from MLT Centre courses by using the unrestricted module for twenty of these. If a course you wish to take is at level 1 or 2 then you need the prior permission of the Director of Teaching, generally this will be given. If you have taken a language course in year three while away and you wish to pursue the language further then you can use the unrestricted module for this, thus taking a maximum of twenty credits from the MLT Centre.

When you return to year four in Sheffield you will be able to take just the same level 3/4 courses as you would have taken in year three — i.e. no year four courses in Sheffield require you to have taken specific topics whilst abroad. Registration for year four courses can be done in September just before term starts. Much information on level 3/4 courses is available on the Sheffield web pages but if you want the up-to-date version of the booklet giving full details of them then email your particular Study in Europe Tutor at around Easter (when the new version is printed) with your postal address.

When you return to Sheffield in year four arrangements will be made to award you the 120 credits for the year abroad, provided of course you have attended and worked assiduously when away. Calculation of the actual mark used as your year three mark in determining your final degree class is described in detail in the document *Assessment of Period of Study Abroad* given to you separately. In summary, we try to use any grades awarded by the partner institution but if for some reason, through no fault of your own, these are not usable then we will base the assessment on grades awarded in Sheffield in years two and four. In addition, you should prepare a written account of the academic aspects of your period abroad. This should include a detailed description of each course taken (~300 words per course) describing the mathematical and statistical topics covered.

As for living abroad, generally your predecessors have found the overall cost of living rather cheaper than in Sheffield, particularly for accommodation in France (with APL, see below) and Germany, provided you do not try to live exactly the same life and buy the same things as in Sheffield. English style bread in France commands a luxury price and in both France and Germany beer in bars is several times the price in supermarkets.

In the first few weeks until you obtain your *Carte de Séjour* or *Aufenthaltserlaubnis* (or equivalent) you should carry some other form of identification with you **at all times** (e.g. passport or other forms of photo-ID). This is a legal requirement in most EU countries though penalties for transgression are relatively mild even if time-consuming. Major credit cards are widely accepted in France (preferably those with a chip rather than just a magnetic strip). In Germany acceptance of credit cards is less universal, especially in supermarkets. Some shops in Germany do not accept Visa but only MasterCard, in a few it is the other way round.

UK Driving licences are valid in all EU countries and most neighbouring ones (e.g. Switzerland, Czech Republic). For Spain, you are strongly advised to obtain either an International Driving Licence (from the AA at Meadowhall) or one of the newer credit-card-sized cards with photo and EU symbol (forms available from the Post Office). All UK motor insurance policies offer the minimum legal protection required to drive in the EU and Switzerland should you take a car abroad. However, the policy may require you to inform the company if the car is abroad for more than one month in any one year or if you change the address at which it is kept. If in doubt, check with your insurance company. A Green Card is required to extend comprehensive insurance to cover a short trip abroad. Comprehensive insurance from a UK company for a UK-registered car kept abroad is extremely expensive and it can be cheaper to buy and insure a car locally.

Key Names & Addresses

Study Abroad Tutors

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Things to take & things to do in the first few days

(In the following lists **A**, **F** and **G** indicate ‘particularly Austria, France & Germany’ respectively.)

A: Pretty Indispensable

- Passport
- ISIC Card + Union Card + University Card
- E128 form (E111 covers emergency treatment only, can be useful to have both)
- English bank details (i.e. name, address, and bank number, account number).
- (**F**) Several recent bank statements showing your income is at least £300 per month.
- P45 form (if you have one).
- Copies of grant forms and/or loan agreements.
- Proof that you are being supported financially (e.g. letter from parents).
- Birth certificate (**full-length version**, not short copy) **and authorized translation (F)**.
- (**F**) A level certificates **and** translations.
- Copy of any insurance policy you (or parents) have covering your possessions or health (you may be required later to take out insurance in **F** or **G**).
- Statement from Sheffield saying that the Year Abroad is part of your degree.
- Driving licence (version with photograph).
- Dictionary (larger the better).
- List of courses/results from first two years in Sheffield.
- List of email addresses and telephone numbers (Tutors etc in Sheffield & abroad: ensure that your Study in Europe Tutor has brought contact names & addresses and numbers up to date.)

You should have several photocopies of all of these (final page only of the passport). Always take **both** the original **and** (a few) copies of **ALL** documents with you when embarking on any bureaucracy. Do not leave the originals unless you absolutely have to — give them the photocopies. Translations and photocopies should be authorized. The MLT Centre may be able to authorize translations, a Departmental Stamp may be sufficient to authorize photocopies or else (**F**) the **CAF** (**caisse d'allocations familiales**) can do this on your first visit to them.

Additionally:

- Enough **cash** (or travellers' cheques) to pay the first month's rent + deposit + living, minimum £750 (or £1500 recommended in or near Paris, especially if renting privately [see below] when 3 months' rent may be needed in advance). Note that travellers' cheques can be very time consuming to cash at banks (sometimes an hour or more) and are not always accepted as direct payment. Germany in particular has a cash-orientated culture.
- **20+** passport photos, some colour and some in B&W. Some of these can be obtained locally (typically cheaper than in UK and (**F**) machines offer option of B&W or colour).
- a Hotmail or Yahoo (etc.) email account for access from Internet cafés (email accounts are rarely provided to students in French Universities nor is there wide access to networked terminals, in other countries it can be some few weeks before a University email account is organised).

B: Also Very Useful

- International phone card (on arrival look into cheap accounts, e.g. OneTel, see note below).
 - Letter of reference from your UK bank (usually provided free of charge) + translation
 - Plug adapters
 - Pocket dictionary
 - Bottle opener
 - Kettle/toaster
 - Travel iron
 - Old university notes
 - Handbook for Sheffield Level 3 courses
- (but beware of weight limits if travelling by air).

C: Things To Do Before and Soon After Arriving

- Ensure that your Study in Europe Tutor has contact addresses & telephone numbers (and email if possible) for all of the time over the summer after the end of term and before you leave the UK (e.g. parental &/or holiday addresses with appropriate dates).
- Ensure parent/guardian (if appropriate) has contact details of study abroad tutors etc in Sheffield.
- Find accommodation with a **contract** or proof of your residency stating the address (i.e. **(F)** *attestation de logement*). If doing this through your University check with them in advance whether you need bed linen and cooking equipment as this varies with Universities. These are invariably required for private accommodation. For private accommodation you need details of parents' bank account (number, address, sorting code) and perhaps parents' pay-slips if they are to act as guarantor. Parents may need to fax a statement of guarantee to a landlord. **(F)** You may be required to take out insurance locally to cover private accommodation.
- Send your Study in Europe Tutor your postal address abroad (we prefer not to use the University address for letters etc.)
- Obtain an official document from the partner institution saying you are a student (i.e. **(F)** *attestation de scolarité*, **(G)** *Zulassungsbescheid*)
- **(G)** Pay your social insurance (Sozialbeitrag) in the Uni-Center. (~DM200 per semester).
- Open a local bank account as soon as possible but you may not be able to do this until you have a local address and documentary confirmation of it (and in **F** a proof of application for a *carte de séjour*). **(F)** Get a **RIB** (**r**elevé d'**i**dentité **b**ancaire). It may be possible to open a bank account with a European bank from the UK — most French and German banks have London offices and your own bank probably has a 'partner' bank that they will recommend. However, it is easier to tap into special student deals (discount cards etc.) if you open an account locally rather than from the UK. You will in any case need to make an arrangement with a branch locally to obtain other items. Some UK Banks allow you to withdraw cash from your current account from machines in Europe but others do not. Even if they do, the exchange rates are often not favourable and it may be cheaper to withdraw money on MasterCard or Visa or Cirrus, even allowing for the cash handling charges. Eurocheques will

cease to exist throughout Europe by 31/12/00 (and already are not used in France & Spain). Note that student banking facilities in some (but not all) UK banks (e.g. overdraft allowances) will stop unless regular sums of money (grant cheques, parental allowances) continue to be paid into the account whilst you are abroad. Check the position before your leave Sheffield.

- **(F)** Find the Mairie and go and fill out an '*état civil*' form **as soon as possible** as it's another useful form of identity/civil status/nationality (take passport, birth certificate, photocopies, translations, photos etc).
- **(F)** Start organising your **carte de séjour** (see below) as soon as possible. This is needed for many subsequent items. It is obtained from the Hôtel de Police or (sous-) Préfecture.
- **(G)** Start organising your **Aufenthaltserlaubnis** (see below) as soon as possible. This is needed for many subsequent items. You are required to obtain this within three months of arrival. It is obtained from the Rathaus.
- **(F)** Ask you University Hall / [(F) Foyer] about **APL (Aide Personnalisée au Logement**, see below) which is the housing benefit you will be refunded from your rent. This is obtained from the **CAF**.
- **(F)** Apply to the **CAF** for a *numéro d'affiliation* from the *Sécurité Sociale* and *assurance de maladie*. This is required if you take any form of job and also allows you to reclaim some medical costs. The number is important and can be used whilst waiting the several months for the *Carte de Sécurité Sociale* to arrive.
- **(A)** Obtain a *Meldezettel* form. Available from Trafiks (tobacconists) for 5 ATS.
- **(A)** Within three days of arrival register with police (**Anmeldung**)
- **(A)** Pay student union (**ÖH**) fees at approx 200 ATS per Semester. This can be done at the Welcome Day
- **(A & some G)** Fill in ECTS credits form and accommodation form before departure. (ECTS = **E**uropean **C**redit **T**ransfer **S**ystem, a method of determining equivalent loads, so 60 ECTS are by definition acquired by a full year's programme of courses, so 1 ECTS credit = 2 Sheffield credits.
- Many universities and some residences will require you to take a medical when you arrive, especially if you want to do sports. If you have an existing medical condition check the terms of your medical insurance, take advice from your doctor on what documentation (with translations) is appropriate. If your institution has a compulsory medical cover you may be required to contribute to it.
- The MLT Centre's website gives some further information. (G) If you go to <http://www.shef.ac.uk/uni/services/mltc/students/index.html> and click on ERASMUS in Bochum you will get a step by step guide prepared by somebody who went to Bochum in 1996/7. Much of this information is relevant to elsewhere in Germany.

D: Items needed to apply for Carte de Séjour (F)

- a) passport + photocopy
- b) full-length birth certificate + authorized translation + photocopies
- c) an *attestation de scolarité* + photocopies
- d) an *attestation de logement* + photocopies (this should have proof of the amount of rent paid).
- e) a *justification de ressources* (e.g. photocopy of grant details & [possibly] letter from parents confirming they will make good any shortfall (with translation))
- f) 4 B&W passport photos
- g) 1 stamped addressed envelope (French address)
(N.B in France stamps are only obtainable from *un tabac* or a post office.)
- h) a *justification du domicile* (electricity or phone bill) or letter (in French) explaining you have none + photocopies.

This list is not definitive. You may find that apparently some items on it cannot be obtained before getting your *carte de séjour*. Try to check exactly which documents you need before spending time standing in the queue. You will probably not obtain your *carte de séjour* immediately, in which case ensure that you do obtain a *récépissé de demande* (proof of application).

E: Items needed to open a bank account in France

- a) *Carte de Séjour* or a *récépissé de demande* + photocopies
- b) passport + photocopy
- c) *justification du domicile* + photocopies
- d) 4 B&W passport photos
- e) an *attestation de scolarité* + photocopies

N.B. in France it is **ILLEGAL TO OVERDRAW** a French bank account. The penalties for doing so are draconian. Note that cheque guarantee cards are not issued in France and so when paying by cheque you will be asked for some proof of identity (e.g. *carte de séjour*).

It may be worth enquiring about a *Carte Bleu* (or *Carte Bleu Internationale*) which allows one to withdraw cash from any branch of any bank in France (or abroad). There may be a charge for this (e.g. 150FF)

F: Items needed to apply for Zulassungsbescheid (G)

- a) passport + photocopies
- b) 4 passport photos
- c) proof of health insurance (E128) + photocopies
- d) Receipt for *Sozialbeitrag* + photocopies

It may be convenient to obtain a German version of the E128 health insurance form from the AOK (Allgemeine Ortskrankenkasse) which will be somewhere in the Mensa or Uni-Center.

G: Items needed to apply for APL (F)

This is a form of housing benefit that may be available if you are staying for a sufficient length of time and if your rent exceeds 25% of your regular monthly income. If [documented] parental contributions are too high then you may not qualify for APL. If your landlord is not declaring that (s)he is letting any property (s)he may be reluctant to help obtain this benefit. The cheapest forms of accommodation (e.g. student residences) may not attract payment of APL but it is worth trying. Compare amounts obtained with friends in similar circumstances and check you are receiving a fair amount. Complain when you find major discrepancies. **N.B.** Typically it takes from 4 to 6 months from time of first application before you receive the first APL payment.

- a) *Carte de Séjour* + photocopies
- b) passport + photocopy
- c) *attestation de logement* + photocopies (this needs to specify amount of rent paid)
- d) *justification du domicile* + photocopies
- e) 4 B&W passport photos
- f) an *attestation de scolarité* + photocopies (this may need to specify the courses followed, the numbers of hours per week and a statement that you will be resident for a full year).
- g) Details of your income (grant and parental contributions).
- h) Details of French bank account (**RIB**)

H: Items needed to apply for Aufenthaltserlaubnis (G)

- a) passport + photocopies
- b) passport photos
- c) proof of finance (e.g. letter from parents, grant documents) + photocopies
- d) proof of health insurance (E128) + photocopies
- e) rent contract (*Mietvertrag*) + photocopies
- f) *Zulassungsbescheid* + photocopies

I: Items needed for Anmeldung (A)

- a) Passport
- b) Meldezettel form.
- c) Signature of your landlord on form

You need to take the completed form along with your passport to your local police station where it will be stamped and signed. The Anmeldung needs to be done within three days of arriving in the country if possible and the Meldezettel is needed to open bank accounts and register for the university.

K: Items needed to open a bank account in Austria

- a) Passport
- b) Meldezettel
- c) Studentenausweis (Student ID) and Studienbuch
- d) Evidence of funds (UK bank statement should be enough)

Make sure you ask for a Bancomat card (c. 200 ATS fee) otherwise you get a near useless card that can only be used to withdraw money from your banks cash machines. A Bancomat card can be used to withdraw cash from any machine in Austria (without fee) and also Cirrus machines world wide (with fee). It also has a Maestro facility (similar to Switch) which is accepted in most shops and supermarkets.

L: Items needed for Welcome Day at TU Graz (A)

- a) 2 Passport photos
- b) 1 Bundesstempelmark for 180 ATS (You can buy these in Trafiks)
- c) 185 ATS for Student Union fees

At the Welcome Day you register for the university and are issued with your Studentenausweis (ID) and Studienbuch (this is used to keep all your Zeugnisse (certificates) from exams in). They also provide lots of information about life in Graz. Note that Trafiks are not open between 12am and 2pm .

M: Procedure for visiting a doctor in France (similar in Germany)

Your University may have special arrangements or a health service, in which case use them. Otherwise, you do not need to register in advance with a doctor or dentist. Most (~95%) of these practitioners are said to be *conventionnés par la Sécurité Sociale*, private doctors can be extremely expensive. It is generally not necessary to make an appointment some days in advance. Note that pharmacists can give excellent advice free of charge and in emergencies can prescribe medicines.

- a) ensure that the doctor or dentist is conventionné(e).
- b) A *consultation* will cost ~200FF and this is paid on the spot. You will receive a *feuille de soins* or *feuille de maladie* stating the amount paid and this is to be forwarded to the *Sécurité Sociale*.
- c) If you are given a prescription (*ordonnance*) take it to a pharmacist who will enter the cost of the medicines (which you have to pay for on the spot) on the *feuille de soins*. You should keep the second copy of this.
- d) Remove the special label on the medication (*vignette*) and stick it on the *feuille de soins*.
- e) Fill in the back of the *feuille de soins* with your name, status, social security number, signature) and take it to the local *Caisse Primaire d'Assurance Maladie* where you will be reimbursed as appropriate either in cash (if you have your *Carte de Sécurité Sociale*) or by bank transfer. A bank transfer can take up to four weeks

Note that *Sécurité Sociale* refunds no more than 70% of medical expenses (perhaps only 40% for prescribed drugs but up to 80% for hospital costs). You are strongly advised to take out medical assurance. Probably the best and cheapest method is to join a *Mutuelle* in France such as the *Mutuelle Nationale des Etudiants de France* (MNEF).

N: Procedure for visiting a doctor in Austria

To get treatment at the doctors you need a Krankenschein which you can get from the Gebietskrankenkasse (GKK). You will need to go to the GKK in person and present the following at the Auslandsamt:

- a) E128 (they take the original so it is worth an E111 to Austria as well for emergencies)
- b) Passport
- c) Meldezettel
- d) Studentenausweis and Studienbuch

The GKK is only open Monday to Friday from 7.30 until 13.00

You pay 50 ATS for a Krankenschein (non-refundable) which is valid for three months. When you visit the doctors you need to present this otherwise you have to pay. In emergencies an E111 will be ok but you might have to pay and claim a refund at the GKK later. Every time you visit a new doctor/specialist or after every three months you need to get a new Krankenschein for a further 50 ATS.

Medicines (both prescription and non-prescription) can only be bought at the Apotheke. Prescription drugs are cheaper when bought with a Krankenschein and the necessary prescription.

It also worth getting a letter from your home doctor/University Health service if you have any special medical conditions or take any prescribed medication.

O: Phones

It is difficult to give specific detailed advice on phones since it varies greatly country by country and also from region to region within the same country. Offers and deals for mobile phones in other countries vary month to month (just as in the UK). **The most important point to remember is that it is very expensive to use a UK mobile (with UK SIM card) when abroad. You have to pay to receive international calls as well as making them. It has been known for people to run up bills of some hundreds of pounds before they discover this.**

Solutions are

- (If you already have a UK Mobile) buy a SIM card locally abroad (e.g. for a Pay As You Go deal) and swap the cards over as you leave/enter the UK. This typically costs the equivalent of about £25.
- Buy a mobile abroad and sign up for a contract suiting your needs (just as in the UK). This will usually require you to sign for a whole year but (**F**) it has been known for the company to cancel the contract if you show a letter from Sheffield declaring that you are required to return to the UK for your studies. (Ask for this at the time).
- Install a fixed line in your flat. This is typically cheaper than in the UK (at least in **F**, no information yet on **G** or **A**), in **F** prices are about £30 installation plus cheaper calls than the UK. Note that in **F** the peak/off-peak times are different from the UK. Waiting time for installation (**F**) is about 2 weeks (but check first).
- Use a phone-card and public phones. You should be able to get a local **OneTel** or similar account to lessen the charges. In **F** the most expensive phone card (FF120) gives you discounts not only on the number of calls but all calls are charged at off-peak rates.
- For parents and friends phoning you from the UK, the cheapest method is to use a **OneTel** (or similar) account to phone a fixed line, typically of the order of 6p per minute to **F** and **G** (much more to **A**). To phone a mobile in the EU it is better to use **ntl** (aka Cable & Wireless) Smartbox. Charges on this are typically 15p per minute to a French registered mobile (cheaper than to a UK mobile in the UK). BT is a little more expensive. OneTel (or similar) is very expensive to overseas mobiles.

Books

A frequent comment from people who have taken mathematics courses abroad is that the first two or three weeks of lectures were especially difficult while 'tuning in' to the language used, however fluent their social language was. It might well be valuable to spend some time reading some basic mathematics and statistics before you go abroad to help lessen this problem. Amazon has a German website (<http://www.amazon.de/>) and this is very easy to use. In France suggested web sites for ordering books are <http://www.amazon.fr/>, <http://www.alapage.com/>, <http://www.decitre.fr/> and <http://www.fnac-direct.fr/>, feedback on success or otherwise in using these would be welcome. The few books below are all moderately priced (less than DM25) but there are many equivalents. You may be able to get reading lists from the partner institution's website. You should aim to look at material suitable for level 1.

(G) The following books have been commended as providing a basic introduction to level one courses in Pure Mathematics, the first is about writing mathematics.

- (a) Beutelspacher: Das ist o.B.d.A. trivial (Vieweg)
- (b) Fischer: Linear Algebra, Analytische Geometrie (Vieweg)
- (c) Forster, O: Analysis I, II, III (Vieweg)

In addition I have copies (which may be borrowed for short periods) of

(G) Hartung, Joachim. Statistik. (Now re-issued as Hartung, Elpelt & Klösener at DM98). This is a very comprehensive manual of statistical theory. All three authors are on the staff at Universität Dortmund.

(F) Lesiuer, Meyer, Joulain & Lefebvre, Algèbre Générale, a general level 1 text covering sets, groups, rings, complex numbers and integration.

(F) Thuizat, Giraully, Aspeeple & Lamat, Mathématique, a school level text covering complex numbers, matrices, random variables etc.

Mathematical Vocabulary

Français	English	Deutsch
l'algèbre	algebra	die Algebra
l'algèbre linéaire	linear algebra	die lineare Algebra (LinA)
analyse	analysis	die Analysis
une suite	sequence	die Folge / die Sequenz
une suite	series	die Reihe
une série de puissances	power series	die Potenzreihe
une fonction	function	die Funktion
un intervalle	interval	das Intervall
réel (le)	real	reell (die reellen Zahlen)
une formule	expression	die Formel(
une formule	written work	der Ausdruck (
(par) récurrence	(by) induction	(durch) (die) (vollständige) Induktion
une limite	limit	der Limes / der Grenzwert
quel que soit	for all/any or given that	für alle /für jedes
de largeur	of given size	gegebener Größe
un entier	whole number	die ganze Zahl, Integer
un rang	row/level/stage	der Rang
croissant(e)	increasing	aufsteigend
décroissant(e)	decreasing	absteigend
par rapport à	with respect to (w.r.t.)	bezüglich (bez. , bzg)
tel que (t.q.)	such that (s.t.)	so daß
encadrement / Théorèmes Gendarmes	sandwich rule (limits)	
converger vers	converge to	konvergiert gegen
la somme	the sum	die Summe
somme continue	integral (i.e. \int)	das Integral
somme discrète	discrete sum (i.e. \sum)	die Summe
le produit	the product	das Produkt
le quotient	quotient	der Quotient, der Bruch
une suite extraite	subsequence	die Teilfolge
borné (e)	bounded	beschränkt
majoré (e)	bounded above	nach oben beschränkt
minoré (e)	bounded below	nach unten beschränkt
si et seulement si (SSI)	if and only if (IFF)	genau dann wenn (gdw)
sans perdre de généralité (note no standard abbreviation)	without loss of generality (wlog)	ohne Beschränkung der Allgemeinheit (o.B.d.A. , O.E.)
impliquer	to imply	folgen, implizieren
faux	false	falsch
vrai	true	wahr, korrekt
la réciproque	reciprocal	reziprok
il existe	there exists	es existiert
un ensemble	set	die Menge
un sous-ensemble	subset	die Teilmenge
un groupe	a group	die Gruppe
extraire	to extract	wählen
un sous-groupe	subgroup	die Untergruppe
un groupe commutatif / un groupe abélien	Abelian group / commutative group	die Abelsche Gruppe / kommutative Gruppe
un anneau	ring	der Ring

Mathematical Vocabulary (Continued)

Français	English	Deutsch
	module (as in algebra)	der Modul (die Moduln)
Un module	module (in university sense)	das Modul (die Module)
Une sous suite	subsequence	die Teilfolge
Les rationnelles	rationals	die rationalen Zahlen
Un vecteur	vector	der Vektor (Vk)
Un espace vectoriel	vector space	Der Vektorraum (VR)
Un sous espace vectoriel	sub vector space	der Untervektorraum (UVR)
Base	basis	die Basis
Une famille libre de vecteurs	family of linearly independent vectors	Familie linear
Indépendant linéairement	linearly independent	linear unabhängig (lin uabh)
Dépendant linéairement	linearly dependent	linear abhängig (lin abh)
Le noyau	kernel	der Kern
$\ker(\alpha) \equiv$ le noyau de α	$\ker(\alpha) \equiv$ the kernel of α	$\ker(\alpha) =$ der Kern von α
Une valeur propre	eigenvalue	der Eigenwert (EW)
Un vecteur propre	eigenvector	der Eigenvektor (EVk)
Une transformation linéaire	linear transformation	die lineare Abbildung (der Vektorraumhomomorphismus)
Un homomorphisme	homomorphism	der Homomorphismus
	orbit	die Bahn
Un déterminant	determinant	die Determinante
Une matrice	matrix (matrices)	die Matrix (die Matrizen)
Carré	squared	zum Quadrat
Une racine	root	die Wurzel
Une racine carrée	square root	die Quadratwurzel
Evident	obvious, it is clear, clearly, trivial, it is easily seen	offensichtlich, trivial, wie man leicht sieht
Vide	empty	leer
Les parenthèses	brackets	die Klammern
Le plan	plane	die Ebene
Un polynôme	polynomial	das Polynom
Le degré	degree	der Grad
Egal, égale, égaux, égales	equal	gleich
Les combinaisons linéaires	linear combinations	die Linearkombinationen
Engendré	generated	erzeugt
Voisinage	neighbourhood	Umgebung
Calculatrice/apparats	calculator	der Taschenrechner
Un ordinateur	computer	der Computer
Une souris	mouse	die Maus
Ecran	screen	der Monitor
Disque dur	hard disk	Die Festplatte
Une disquette	floppy disk	das (Floppy) Laufwerk
Appartenir	to belong to	ist ein Element von
A appartient à \mathfrak{R}	$a \in \mathfrak{R}$	a (ist ein) Element (von) \mathfrak{R}
Intervalle fermé	closed interval	das abgeschlossene Intervall
Intervalle ouvert	open interval	das offene Intervall
Intervalle semi-overt	half open interval, (a, b]	das halboffene Intervall,]a,b]

Mathematical Vocabulary (Continued)

Français	English	Deutsch
$[a, b]$ ($\equiv a \leq x \leq b$)	$[a, b]$ ($\equiv a \leq x \leq b$)	$[a, b]$
$]a, b[$ ($\equiv a < x < b$)	(a, b) ($\equiv a < x < b$)	$]a, b[$
$[a, b[\times]c, d]$	$[a, b) \times (c, d]$	$[a, b[\times]c, d]$ or $[a, b) \times (c, d]$
$[0, \infty [\cap [-1, 5]$	$[0, \infty) \cap [-1, 5]$	$[0, \infty [\cap [-1, 5]$ or $[0, \infty) \cap [-1, 5]$
Un indice	power/index	der Index, die Indizes
unicité	uniqueness	die Eindeutigkeit
plus petit commun multiple (ppcm)	lowest common multiple (lcm)	das kleinste gemeinsame Vielfache (kgV)
plus grand commun diviseur (pgcd)	highest common factor (hcf)	der größte gemeinsame Teiler (ggT)
moins	minus	minus
plus	plus	plus
facteur	factor	Der Faktor
les nombres premiers	prime numbers	die Primzahl
logarithme népérien	natural logarithm (\log_e)	der (natürliche) Logarithmus
logarithme décimal	common logarithm (\log_{10})	der Logarithmus (zur Basis 10)
développements limités	Taylor expansion	die Taylor Entwicklung
intégration par parties	integration by parts	partielle Integration
longueur	length	die Länge
largeur	width	die Weite
équation différentielle	differential equation	die Differentialgleichung
probabilité	probability	die Wahrscheinlichkeit
distribution	distribution	die Verteilung
fonction de distribution	distribution function	die Verteilungsfunktion
densité de probabilité	density function	die Dichtefunktion
erreur	error	der Fehler
la moyenne	mean	das Mittel (der Mittelwert)
l'induction statistique	statistical inference	statistische Schlußweisen
aléatoire / stochastique	random	zufall
variable aléatoire	random variable	die Zufallsvariable
échantillon / (sondage)	sample	die Stichprobe
échantillon aléatoire simple	simple random sample	die einfache Zufallsstichprobe
une estimation	estimate	die Schätzung
un estimateur	estimator	der Schätzer
espérance mathématique	expectation	der Erwartungswert
sans biais	unbiased	erwartungstreu
convergent	consistent	konsistent
erreur quadratique moyenne	mean squared error (MSE)	mittlere quadratische Fehler
biais	bias	die Verzerrung (das Bias)
estimateur par la méthode du maximum vraisemblance	maximum likelihood estimator (MLE)	der Maximum-Likelihood-Schätzer (ML-Schätzer)
intervalle de confiance	confidence interval	das Konfidenzintervall
test	statistical test	der statistische Test
seuil	level (size)	das Niveau
seuil de signification	significance level	das Signifikanzniveau
test z de Fisher	one-sample Normal test (z-test)	der Einstichprobengaußtest
	test statistic	die Teststatistik (die Prüfgröße)
un camembert	pie chart	Das torten Diagramm
un diagramme tuyaux-orgues	bar chart	

