



European Research Council

# **ERC Grant Schemes**

## **Guide for Peer Reviewers**

**Applicable to the ERC  
Starting Grants and Advanced Grants  
(Work-Programme 2010)**

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**European Commission**  
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## 1. Introduction

The selection of scientific and scholarly proposals for funding by the ERC is based strictly on peer review with excellence as the sole criterion. ERC uses a typical panel-based system, in which panels of high-level scientists and/or scholars make recommendations for funding either autonomously, or based on the findings of specialists external to the panel - the referees.

### *The "Rules"*

The ERC Scientific Council (**ERC-ScC** or **ScC**) has established a document, adopted by the Commission, namely the "**Rules on proposal submission, evaluation and award procedures relevant to the Ideas Specific Programme**" ("Rules"). This document defines number of high-level requirements on the processes put into operation by the ERC.

### *The Work-Programme*

The ERC-ScC has also established the **Work-Programme (WP) for 2010**, which was adopted by the European Commission (C(2009) 5928 of 29 July 2009)). The WP for 2010 in particular, defines the parameters of the Call for Proposals for ERC Starting Grants and Advanced Grants . More specifically, it defines the call deadline(s), the call budget, it stipulates that a two-step peer review procedure will be applied following a single submission of a full proposal, it sets the framework for budgetary decisions, and it specifies the evaluation criteria.

### *This document*

This document complements these legal texts. It specifies in more detail the review process and its inputs and outputs, and it defines the responsibilities of the participants in the process. It details the "Rules" in a number of important issues, such as: a clarification of the methodology as regards inter-disciplinary proposals; practical guidelines for the management of conflict of interest; and a clarification on budgetary inter-panel and inter-domain issues.

## 2. Domain and Panel structure

The ERC has a mandate to implement a bottom-up, investigator-driven approach to funding. Consequently, the principal objective of the peer review system is to select the best science, independent of its discipline and independent of the particularities of the review panel structure. The panel structure is, in essence, no more than an operational instrument.

A single submission of the full proposal will be followed by a two-step evaluation. The applicant decides to which primary panel he/she submits the proposal. The review of the proposals is then conducted by review panels in two steps.



In this context, the ERC has established a panel structure consisting of 25 panel titles, grouped in three disciplinary domains, covering the entire spectrum of science and scholarship in the remit of the ERC;

- Social sciences and Humanities (SH)
- Life sciences (LS)
- Physical and Engineering Sciences (PE)
- 

In defining the structure, a forward-looking approach was taken and narrow disciplinary definitions have been avoided.

The treatment of inter-disciplinary proposals is foreseen by the creation of a fourth (Interdisciplinary) domain and applications referred to it will be further evaluated by the Panel Chairs or their delegated panel members at a separate meeting subsequent to the disciplinary panels.

The panel structure is presented in Annex 1.

### 3. Panel Chairs, panel members and referees

#### ***The panels***

An ERC panel, for a particular review session, will consist of a chairperson plus approximately 10 members. The chair and the members have been selected by the ERC-ScC on the basis of their scientific reputation. They make a significant commitment of their time to the ERC review process. The Panels will each meet twice to carry out a two-step review of proposals.

**Panel Chairs and members** perform the following tasks:

1. Familiarisation with proposals in their panel in preparation for the panel meetings
2. Individual review of a subset of those proposals – by electronic means – in preparation for the panel meetings
3. Participation in the panel meetings

**Panel Chairs** have additional tasks and responsibilities, working in close collaboration with the ERC's Scientific Officer for the panel concerned:

1. Chairing the panel meetings
2. Allocation of proposals to review panels and appropriate career stage for evaluation ("starters" vs. "consolidators") according to the relevant WP .
3. Assignment of proposals to Panel Members (and remote referees) for individual review.
4. Ensuring the Panels produce all necessary deliverables of the required quality standards *by the end of the panel meetings*, including the ranked lists and feedback for applicants.
5. Attendance of the Initial Panel Chairs' meeting in order to assess the response to the Call for proposal and plan the work of the panel accordingly.



6. Participation in a final meeting of Panel Chairs to consolidate the results of different panels. Panel Chairs can delegate this task to one of the panel members.

The name of the panel chair is publicly available after the call deadline, and is specified by panel. The names of panel members will also be published by panel at the end of the Call..

### ***The referees***

In addition to the panels and panel members (who act as “generalists”), the ERC works with remote referees. These are scientists and scholars who bring to bear the necessary *specialised* expertise. Referees work remotely and deliver their individual reviews by electronic means. Because of the specialised nature of the work, the demands on the time of individual referees will be comparatively smaller (of the order of a day). The names of the referees will be made public at the end of each year.

The assignment of referees to proposals is carried out under the responsibility of the Panel Chairs in collaboration with the ERC's Scientific Officer. There is no limitation on the participation of any member of the international scientific community to act as referee, subject to the approval and accreditation of the person in question by the ScC

### ***The appointment letters***

In all cases, the relationship between the ERCEA and the reviewers is defined by a written and signed agreement (the Appointment Letter). Signature of this agreement by the reviewer indicates acceptance of the conditions regarding confidentiality, conflict of interest, and use of personal data by the ERCEA. ERCEA can not make available proposals to a reviewer who has not been officially appointed (i.e. signed the appointment letter and in so doing agreed to the terms laid down including in particular, confidentiality and Conflict of Interest). The model Appointment Letter is included in the "Rules".

## **4. The approach to inter-disciplinary proposals**

### ***Inter-disciplinary Domain***

The choice indicated by the applicant is paramount in determining the panel under which a proposal is evaluated. The broad definition of the panels allows many inter-disciplinary proposals to be treated within a single panel (mainstreaming of inter-disciplinarity). Interdisciplinary proposals (across panels or across domains) will be flagged as such, and the panel may request additional reviews by appropriate members of other panel(s) or additional remote referees.

The Work Programme makes provision for a so-called 'fourth domain' where interdisciplinary proposals not funded within the individual panel budgets can be brought forward for further discussion by the panel chairs. A proposal will be considered as interdisciplinary where an applicant has explicitly mentioned a second panel in the application form. There may however be exceptions when the applicant has not done so



by mistake. The Panel Chairs may in such cases decide that these proposals are interdisciplinary.

Following the conclusion of the panel reviews, Panel Chairs or their delegated panel members will meet and discuss, from an interdisciplinary point of view, proposals above the quality threshold and which have been placed on the panel reserve lists which are clearly interdisciplinary (cross panels or cross domain), in order to establish the ranked list of the Interdisciplinary Research Domain (see section 11 below).

### ***Responsibility of the Panels:***

The responsibility to ensure that inter-disciplinary proposals receive equal and fair treatment rests fundamentally with the panels to which they are allocated. (No proposal will be allocated to multiple panels, as this would introduce unequal treatment as a function of panel structure).

The structure of the review criteria, defined in the WP, allows the panels to fulfil this responsibility. In the first step the review panels can come to clear recommendations on the potential of the Principal Investigator, and the quality of the research proposed, even while recognising that certain scientific aspects of the proposals may not be fully covered by the panel's specialities (Note that the same may be true for proposals that fall entirely within the panel). The panels and panel members therefore play a “*generalist*” role.

### ***The contribution from remote referees***

In the second step of the review, in addition to at least three Panel Members, proposals will be assigned to 2-5 referees – working remotely – to take advantage of the best spectrum of specialised expertise. Their reviews will then form the basis for the panel discussions.

## **5. Distribution of budget: main principles**

### ***Initial allocation to the domains***

The Work Programme establishes an indicative budget distribution of the total call budget between the three main research domains (PE 39%, LS 34% and SH 14%. The Interdisciplinary domain has been allocated an indicative amount of 13%.

### ***Allocation of indicative budget to panels***

An indicative budget will be allocated to each panel, in proportion to the budgetary demand. The budget is calculated on the basis of the cumulative grant request of all proposals to the panel as a proportion of the cumulative grant request in response to the domain of the call.



## 6. The individual reviews

Individual reviews are carried out prior to panel meetings. Panel Members, and referees participate in the individual review stage.

### ***Minimum requirements***

The “Rules” stipulate that each proposal shall be subject to at least 3 individual reviews. In Step 1, all proposals will be reviewed by Panel Members. In case of a high workload, they will be supported by members of the relevant “shadow” panel. In step 2, reviews will be carried out by Panel Members (ideally 3) and include referees (ideally 2-3). Each application is assigned to a “lead reviewer”. This person introduces the discussion on the application and is responsible for the “report” to be returned as feedback to the applicant.

The applicant submits the proposal to a primary review panel. If the applicant has indicated a secondary review panel, the primary panel will determine whether the proposal is indeed cross-panel or cross-domain interdisciplinary and may request additional reviews by appropriate members of other panel(s) or additional referees. If the primary panel decides that the proposal is well within the panel's scope then it will only be evaluated by this panel.

### ***The interpretation of “individual”***

During the individual review, there shall be no discussions of the proposals concerned between the reviewers.

### ***Marks and comments***

Individual reviewing consists of:

- Awarding marks for each of the evaluation criteria (including yes/no recommendations for the third criterion) .
- Providing a succinct but substantial explanatory comment for each mark.

### ***The importance of marks and comments***

Both marks and comments are critically important as they form the basis of the feedback to the applicants:

- The individual review marks determine the relative position on the list which is the starting point for the panel discussions.
- The comments will be included in the Evaluation Report, in principle as received (see also section 12). Reviewers should therefore take care in the formulation of comments in their individual assessments.

### ***The nature of the comments***

Comments should be provided by each reviewer for each criterion. They should be succinct but substantial. They should also be impeccably polite.

Comments should take the form of a statement and explanation of key strengths and key weaknesses, in the light of the criteria.

Reviewers are encouraged to observe the following additional guidelines:



- Avoid comments that give a description or a summary of the proposal.
- Avoid the use of the first person or equivalent: "I think..." or "This reviewer finds...".
- Always use dispassionate and analytical language: avoid dismissive statements about either the PI, the proposed science, or the scientific field concerned.

In case a very large number of proposals is received, some standardisation of the comments may be implemented.

Individual reviews have to be submitted in due time prior to the panel meeting.

### ***The range of marks***

Panels and referees will evaluate and mark the proposals under the criteria of **Heading 1: Principal Investigator** and **Heading 2: Research project**. The proposals will be evaluated under **Heading 3: Research Environment** during Step 2 of the review. This will be done on a "pass/fail" basis and commented but not marked.

Each proposal will receive a mark on a scale of 1 to 4 for each of the 2 review criteria (Heading 1 and 2). Marks are awarded in integers or halves. Marks for criteria 1 and 2 range from 1 (non-competitive) ... to 4 (outstanding).. As a general recommendation, it seems reasonable to advise panels that they reserve the highest mark - 4.0 (outstanding) - for the top 10% of proposals, marks 4.0 or 3.5 only for the top 20%, and marks 4.0, 3.5 and 3.0 only for the top 30% of proposals. In all cases, reviewers are requested to stick strictly to the review criteria.

A quality threshold of  $\geq 2$  will be applied on these review criteria and used to establish the "retained list" of the proposals which will be ranked in order of priority for funding. If a proposal is marked below the quality threshold on any of the 2 review criteria, it will not be further evaluated.

### ***Review of the Grant level***

Panels should only recommend reductions in the level of the grant where there are specific recommendations for a particular proposal (i.e. there should be no across-the-board cuts). Recommendations for amendments to the amount granted must be documented and explained in the Panel comments for each proposal concerned based on an analysis of the resources requested to carry out the work.

The appropriate level of budget should be evaluated within the 'Research project' criterion under the heading 'Methodology' which refers to resources. Panels are advised to consider carefully whether recommendations for large reductions may in fact be a reflection of a weak proposal and whether it would be advisable to reject the proposal.

## **7. Conflict of Interest**

Peer-reviewers should not be put in a situation in which their impartiality might be questioned, or where the suspicion could arise that recommendations are affected by elements that lie outside the scope of the review. To that effect, the ERC has formulated



a clear set of rules pertaining to conflict of interest (CoI) in the "Rules". These rules are incorporated in the Appointment Letter, in the form of the need for disclosure by the reviewer of any actual (disqualifying) or potential conflict of interest regarding the proposals. Conflict of interest arises when an applicant, evaluator or referee have a significant collaborative, conflictual or ongoing mentor/mentee relationship; have close family ties or a personal relationship; have direct financial or administrative dependencies; or are close colleagues in the same institution.

In the "potential" case, ERCEA will make a decision whether the situation in question constitutes an actual CoI - or whether no CoI exists.

### ***No individual assessments under CoI***

No reviewer shall make an individual review of a proposal while under a CoI with it. To that effect, the Panel chair shall avoid making conflicting assignments of proposals to reviewers, on the basis of the information available. Beyond the measures taken by the ERCEA, reviewers are bound to disclose any CoIs and will not participate when an application that places them in CoI is being evaluated.

### ***CoI and panel meetings***

- Any CoIs must be declared prior to, or in the beginning of, the panel meeting, to all meeting participants.
- A panel member will refrain from any attempt to influence the result of the review of any proposal with which he / she has a CoI. In particular, the panel member will not participate in the discussion, or in any voting, related to that proposal. Panel members should leave the room when detailed discussions or decisions are taking place on proposals for which they have a CoI
- Note also that no Panel Member is permitted to contribute to a proposal (either as a P.I. or a team member) and remain an active panel member. In such cases the Panel Member should step aside for that round of evaluations.

## **8. The criteria**

The criteria express the objectives of the ERC activity at the level of the review. They are, therefore, defined in the Work Programme. There are two types of criteria:

- Eligibility criteria.
- Evaluation criteria.

### ***Eligibility criteria***

Eligibility criteria are simple, factual and legally-binding criteria. Their interpretation does not involve scientific judgement. Hence, eligibility is not part of the review process. Instead, it is carried out in parallel by the ERCEA. Most ineligible proposals will be identified prior to the review. However, in some (rare) cases proposals may be withdrawn during or even after the review, as ineligibility can only be confirmed with some delay.



### ***Evaluation criteria***

The evaluation criteria are at the core of the review process. The evaluation criteria and their interpretation are described in the WP All judgement on proposals must be made against the evaluation criteria, and these criteria alone.

## **9. Preparation and organisation of the Panel Meetings**

### ***Autonomy of Panel Chairs***

Panel Chairs have a high degree of autonomy in the conduct of their meetings: which proposals to discuss in detail, in which order, when to resort to voting and how to vote, etcetera. The conduct of the meetings will also be influenced by the numbers of proposals to be reviewed by the panel.

### ***The efficiency of meetings and preparation***

The ERC attaches great importance to the principle that panel meetings should be efficient. For that reason, preparatory work is carried out by electronic means in advance of the meeting:

1. Panel Members familiarise themselves with proposals in their panel, in order to be able to make high-quality recommendations.
2. Panel Members and the panel evaluators carry out individual reviews of a subset of proposals.
3. In the second step, remote referees also contribute individual reviews. In the first step, each Panel Member will be asked to recommend potential remote referees for an in-depth review of those proposals he/she recommends to be retained for step 2.

The prior individual review stage increases efficiency in two ways:

1. By creating a preliminary ranking, allowing panel discussions to focus their attention on those proposals that merit substantial discussion, and allowing an early elimination of low-ranked proposals.
2. By gathering elements of the feedback to applicants. In particular for the low ranked proposals, the comments obtained by individual review may sufficiently capture the substantial reasons for the rejection, and – subject to panel agreement – no further comments by the panel are necessary.

### ***Ranking methodology***

Starting from the preliminary ranking, panels may decide to go through a process of successive elimination stages, where the depth of discussion increases as the number of proposals in contention is reduced. For each eliminated proposal, panels will either decide to adopt the average mark originating from the individual reviews, or to assign a different mark. They will also give an appropriate panel comment (see feedback to applicants section).

### ***The possible use of a voting system***

In the later stages of this process, panels may expedite their ranking-process by the use of a voting system. In such a system, each panel member will distribute a number of votes to his / her preferred proposals, and proposals would be ranked on the basis of



the votes. A panel member can not vote for a proposal if under a Col, and an appropriate correction is applied. The voting shall avoid tactical behaviour; however, after voting is complete, individual votes are transparent to the panel. The results of such a vote need not be binding. The voting is to be considered mainly as an effective way to create a ranking based on a set of individual preferences.

### ***Outputs of the panel meetings***

The output of an individual panel meeting, to be completed at the end of the meeting, consists of the following elements:

1. The necessary lists of proposals, depending on the Step
2. The feedback to applicants (see the relevant section)
3. A panel report

### ***The panel report***

In addition to the necessary lists of proposals, the panel report (prepared by the Panel Chair) briefly documents the methodology followed by the panel. It also contains, as appropriate, reflections on issues such as the quality of proposals in relation to the budget and observations on inter-disciplinary proposals. It may contain recommendations to be taken into account by the ERC in future review sessions.

## **10. The tasks of the Panel Meetings**

***In Step-1 of the review process section one of the proposal is assessed marked and ranked.***

In Step-1, the panel makes three types of recommendations:

1. The proposals that should go forward to the second step. The number of proposals included should normally correspond to 2.5 times the panel's indicative budget in the case of the Starting Grant and 3 times the panel's indicative budget in the case of the Advanced Grant (for the Starting Grant this must never exceed 3 times the panel's indicative budget) and should only include proposals with final scores above the threshold.
2. The proposals with a mark passing both quality thresholds (for each criterion this is 2) but which fall below the budgetary threshold for the panel. These proposals are not recommended for funding .
3. The proposals to be rejected because their final scores fall below the success threshold.

For cases 2 and 3, resubmission restrictions may apply as determined by the ERC Scientific Council, and specified in the Work Programme relevant to any future call.



### ***In Step-2: panels produce a ranked list and identify interdisciplinary proposals.***

All sections of the retained proposals will be assessed and ranked by the panels during Step 2 of the review (Criteria 1, 2 and 3). Proposals that are of inter-disciplinary nature and that demand particular attention at inter-panel or inter-domain level will be identified.

There are three outputs from the Panel Meetings in the second step:

1. The ranked list of proposals which are inside the Panel's indicative budget. Their final scores (given by the panel) must be above the success threshold.
2. Proposals ranked outside the indicative budget whose final scores are above the success threshold. These proposals form the reserve list.. Those proposals on the Reserve List which have been identified as interdisciplinary will also be referred to the Final Panel Chairs' Meeting.
3. A list of Proposals not recommended for funding and which should be rejected.

Following the completion of the Panel meetings in each domain, the Panel Chairs will agree on a consolidated ranked list of proposals above the quality threshold which can be proposed for funding in order of priority within that domain.

## **11. The Panel Chairs meeting and review of interdisciplinary proposals**

Once the panel meetings are completed and the consolidated ranked lists prepared, a meeting of Panel Chairs (or their delegated panel members) will be organised. The purpose of this meeting will be to consider a number of proposals of an interdisciplinary nature (including cross-panel and cross-domain and projects with the potential to open up new fields) above the quality threshold. Panel Chairs will further discuss these proposals and produce a ranked list. This ranked list will be compared to the unfunded proposals from the panels' ranked lists in order to maintain the level of quality.

Any funds still available in any of the 4 domains, after exhausting the list of proposals over the quality threshold, will be distributed to the other domains.

The reserve list is to allow for eventualities such as the failure of the conclusion of Grant Agreements, the withdrawal of proposals, budget savings agreed during the granting process, or the availability of additional budget from other sources. Additional funds will also be distributed according to the initial call budget breakdown.



## 12. Feedback to applicants

Apart from the recommendations on "fundability" of proposals and their ranking, the most important output of the panel meetings is the feedback to applicants. According to the "Rules", the ERCEA will provide an Evaluation Report to each applicant, which documents the results of the review, in terms of marks and comments. Especially in case of rejection, the Evaluation Report needs to convey a credible explanation of the fate of the proposal. The principle applies that the Evaluation Report will contain a documentation of all observations on the proposal, both from individual reviewers and from the panels.

### ***Elements of the Evaluation Report***

The Evaluation Report of the ERCEA is comprised of three components:

- 1) The final marks and decision of the panel
- 2). A comment by the panel, written by the "lead reviewer" and approved by the panel.
- 3).The comments from the individual reviews given by referees and Panel Members prior to the panel meeting

### ***The comments by individual reviewers***

The comments by remote reviewers (panel members and referees) are included in the Evaluation Report in principle as received. They may be subject to mild editing by the ERCEA, without altering the intended message, in order to enhance clarity, remove any inappropriate, irrelevant or polemic remarks, remove revelation of the referee's identity, misleading recommendations, etc. These comments may not necessarily be convergent – differences of opinion about the merits of a proposal are legitimate, and it is potentially useful for an applicant to be informed of the various views.

### ***The panel comment***

In many cases the comments by the individual reviewers provide a sufficient explanation of the fate of the proposal. In such cases, the panel comment will typically simply acknowledge the weaknesses or strengths pointed out by the individual reviewers. It will then not contain observations that substantially deviate from the view expressed by the individual reviewers.

In other cases, the panel may take a position that is different from what could be inferred from the comments of the individual reviewers. For example, if the panel discussion reveals an important weakness in a proposal the panel comment will document its reasons in a substantial comment.

In the first step, a number of proposals of reasonable / good quality but lying below the budgetary cut-off level will be rejected. Such proposals may typically have positive comments from individual reviewers; however they do not gather enough support from Panel Members when taking into account the budgetary constraint. In such cases, the panel comments may be expressed in these terms.



### **13. The role of the Scientific Council**

The ERC-ScC may delegate its members to attend panel meetings. The role of the ScC delegates relates to ensuring and promoting coherence of reviews between panels, to identifying best practices and to gathering information for future reviews of the procedures by the ScC.

In conformity with the mandate of the ScC to carry out the scientific governance of the ERC, and in line with the role of the ScC foreseen in the WP, ScC members will abstain from influencing the results of the review process.

### **14. The role of Independent Observers**

Under the Rules, the ERCEA has an obligation to invite Independent Observers to observe its review sessions at regular intervals. The Independent Observers are independent of the ERCEA and of the ScC. Their function and role is described in the "Rules".



## **Annex 1: ERC Peer Review Panel Structure**

### **Social Sciences and Humanities**

**SH1 Individuals, Institutions and Markets:** economics, finance and management

**SH2 Institutions, values, beliefs and behaviour:** sociology, social anthropology, political science, law, communication, social studies of science and technology

**SH3 Environment and society:** environmental studies, demography, social geography, urban and regional studies

**SH4 The Human Mind and its complexity:** cognition, psychology, linguistics, philosophy and education

**SH5 Cultures and cultural production:** literature, visual and performing arts, music, cultural and comparative studies

**SH6 The study of the human past:** archaeology, history and memory

### **Mathematics, physical sciences, information and communication, engineering, universe and earth sciences**

**PE1 Mathematical foundations:** all areas of mathematics, pure and applied, plus mathematical foundations of computer science, mathematical physics and statistics

**PE2 Fundamental constituents of matter:** particle, nuclear, plasma, atomic, molecular, gas, and optical physics

**PE3 Condensed matter physics:** structure, electronic properties, fluids, nanosciences

**PE4 Physical and Analytical Chemical sciences:** analytical chemistry, chemical theory, physical chemistry/chemical physics



**PE5 Materials and Synthesis:** materials synthesis, structure-properties relations, functional and advanced materials, molecular architecture, organic chemistry

**PE6 Computer science and informatics:** informatics and information systems, computer science, scientific computing, intelligent systems

**PE7 Systems and communication engineering:** electronic, communication, optical and systems engineering

**PE8 Products and process engineering:** product design, process design and control, construction methods, civil engineering, energy systems, material engineering

**PE9 Universe sciences:** astro-physics/chemistry/biology; solar system; stellar, galactic and extragalactic astronomy, planetary systems, cosmology; space science, instrumentation

**PE10 Earth system science:** physical geography, geology, geophysics, meteorology, oceanography, climatology, ecology, global environmental change, biogeochemical cycles, natural resources management

## **Life Sciences**

**LS1 Molecular and Structural Biology and Biochemistry:** molecular biology, biochemistry, biophysics, structural biology, biochemistry of signal transduction

**LS2 Genetics, Genomics, Bioinformatics and Systems Biology:** genetics, population genetics, molecular genetics, genomics, transcriptomics, proteomics, metabolomics, bioinformatics, computational biology, biostatistics, biological modelling and simulation, systems biology, genetic epidemiology

**LS3 Cellular and Developmental Biology:** cell biology, cell physiology, signal transduction, organogenesis, developmental genetics, pattern formation in plants and animals

**LS4 Physiology, Pathophysiology and Endocrinology:** organ physiology, pathophysiology, endocrinology, metabolism, ageing, regeneration, tumorigenesis, cardiovascular disease, metabolic syndrome

**LS5 Neurosciences and neural disorders:** neurobiology, neuroanatomy, neurophysiology, neurochemistry, neuropharmacology, neuroimaging, systems neuroscience, neurological disorders, psychiatry

**LS6 Immunity and infection:** immunobiology, aetiology of immune disorders, microbiology, virology, parasitology, global and other infectious diseases, population dynamics of infectious diseases, veterinary medicine

**LS7 Diagnostic tools, therapies and public health:** aetiology, diagnosis and treatment of disease, public health, epidemiology, pharmacology, clinical medicine, regenerative medicine, medical ethics



**LS8 Evolutionary, population and environmental biology:** evolution, ecology, animal behaviour, population biology, biodiversity, biogeography, marine biology, ecotoxicology, prokaryotic biology

**LS9 Applied life sciences and biotechnology:** agricultural, animal, fishery, forestry and food sciences; biotechnology, chemical biology, genetic engineering, synthetic biology, industrial biosciences; environmental biotechnology and remediation