Students-Professors Joint Committee
Annual Report 2022
(Academic Year: 2020/2021)

This document contains the Annual Report of the Students-Professors Joint Committee, in accordance with SISSA Quality Policy Guidelines. The Committee, regulated by Article 13 of the School Statute, is composed of Prof. Alessandro Laio of the Physics Area (Coordinator); Dr. Michele Giugliano of the Neurosciences Area; Prof. Antonio Lerario of the Mathematics Area; Dr. Jacopo Mazza, Physics Area students’ representative; Dr. Jacopo Zanchettin, Mathematics Area students’ representative; Dr. Francesco Diversi, Neuroscience Area students’ representative.

NOTE ON METHODOLOGY
The Committee’s principal task is to draw up an annual report that examines the entirety of the educational offer, with particular reference to the results of the survey of student opinion, indicating any problems specific to particular PhD programmes. Analysis of questionnaire answers collated anonymously indicates a School in overall good health with a generally high level of student satisfaction, in line with the findings of previous years. The Committee decided to focus the report on identification of critical issues, rather than highlighting and discussing the many positive findings, which provide little useful information for improving the School’s educational offer. These critical issues are discussed in the first part of the report. In some cases the Committee has chosen to suggest strategies to address these problems. These suggestions are presented in italic font.

Many of these critical issues were highlighted in last year’s report, and the initiatives taken to address them in different PhD programmes are briefly mentioned in the second part of the report, which examines individual programmes. A qualitative analysis of the responses showed that many critical issues are common to all PhD programmes while some problems are more significant in particular cases. To identify questions for which it was appropriate to discuss statistics disaggregated by PhD programme, we calculated the normalised mutual information (NMI) of answers and the PhD programmes from which they were received (en.wikipedia.org/wiki/Mutual_information). The NMI has a value of 1 if answers are totally different between programmes, and 0 if answers show the same pattern. The low number of students on each PhD programme may cause
high NMI values to arise by chance. We therefore calculated the statistical significance of the observed NMIs expressed as the Z-score, i.e. the difference between the observed and most probable NMI expressed as a standard deviation. The Committee considered it useful to present the data in disaggregated form for each PhD programme with a Z-score higher than 1.5.

The Committee has also analysed variations between this year's answers and those of the previous year. Here the z-score was calculated by allocating answers to two categories (“mostly good” and “mostly bad”). The frequency of the two categories in academic year 19/20 was used to define a reference binomial distribution, this being further used to calculate the z-score of the observed frequency in 20/21. Variations in the disaggregated data for individual PhD programmes are very often not significant, with a few exceptions discussed below. However, variations in the aggregated data are often significant, with a general negative trend apparent in the main critical issues.

ANALYSIS OF CRITICAL ISSUES IN THE EDUCATIONAL OFFER

Low response to the questionnaire

The first important critical issue relates to the questionnaire response rate, which was 69.5%. Although in line with the previous year, this figure is too low for a tool widely considered essential for assessing our institution’s state of health.

Analysis of the figures shows the response rate to be high in some PhD programmes but low in others, particularly Molecular Biology (JuMBo) and Astroparticle Physics, where it was under 50% (Figure 1). None of the second-year Functional and Structural Genomics students responded to questionnaire.
This problem, already noted in the previous report, does not seem to have been solved effectively by measures implemented this year. The student representatives in our Committee consider that the low participation was due to a fear that anonymity was at risk, given the small numbers. This fear is understandable, and the Committee believes that corrective measures should be taken to strengthen anonymity.

*In particular, it is proposed that the Committee should receive questionnaire results in randomised form for students of any single PhD programme. This will ensure that an individual student's answers will be part of a random set of answers received from all students on the same PhD programme, making specific identification impossible. For questions addressed to students in their first or final year, randomisation will clearly have to conserve this information. It is also suggested that multimedia "totems" be installed and a campus-only intranet web page created to communicate events, initiatives, seminars, colloquiums, etc.*

**Low working wellbeing**

A second critical issue is that of wellbeing, assessed as low by 24% of students, and very low by 7.5%. This means that one third of students do not feel “happy, healthy and motivated”. The free comments indicate that this high incidence is probably a result of the Covid emergency. However, it is obviously important that this parameter should be monitored in subsequent surveys. The question on working wellbeing did not appear in the previous questionnaire, therefore it is not possible to detect trends. There were no statistically significant differences in the answers to this question between students of different PhD programmes (Z-score = 1.15).

However, significant differences emerge between different PhD programmes (Z-score = 5.1), when answers to the question on the number of hours worked daily (Figure 2) are analysed. Significantly higher figures are reported by certain PhD programmes: 28.5% of students report working more than 4 hours a day on average at weekends, and 6.5% even report working more than 8 hours a day at weekends.
However, significant differences in working hours do not seem to correlate meaningfully with student wellbeing, as illustrated by Figure 3, which shows the distribution of answers on wellbeing restricted to the categories of students who work a similar number of hours. On the basis of this analysis, the Committee considers that differences in the number of hours worked are within the norm, and finds no particular critical issues associated with this parameter.
The availability of psychological support is highly appreciated by students. However, the Committee notes many complaints about the difficulty of accessing the service, with waiting times of months not unknown. A total of two psychologists seem insufficient for a community the size of SISSA. It is possible that the level of demand is associated with the Covid emergency.

*The committee hopes to consult directly with the psychologists in charge of the service in order to assess the possibility of strengthening it.*

**Moderate level of internationalisation, and respect for diversity**

The level of internationalisation remains moderate. Overall, 67% of scholarship students in the five-year period 2017-2021 were Italian, 1% EU (non-Italian), and 25% non-EU. There were no significant differences in these percentages (Figure 3), other than an almost complete absence of "EU (non-Italian)" in the last academic year of the period.
Around 18\% of questionnaire respondents were from non-EU countries. In the free comments, foreign students highlighted **significant difficulties in establishing contacts and social interactions**, undoubtedly aggravated by the pandemic.

With regard to the **matter of possible discrimination**, the Committee feels some concern. In Figure 4, we report responses to the question “While at SISSA, have you ever felt discriminated based of your appearance, ethnicity, gender, religion?”. These seem to suggest possible instances of discrimination in some PhD programmes (Z-score = 1.8).

![Figure 5: Perception of discrimination.](image)

This question did not appear in the previous questionnaire, and it is therefore not possible to detect trends. This problem is frequently mentioned in the free comments of **foreign students**, who feel excluded from many social and work interactions because of the constant use of Italian in SISSA environments. Foreign students also raise complaints about the **lack of effective support** for the resolution of bureaucratic and administrative issues. The Committee notes that an office for these matters already exists (Office for International Relations, [https://www.sissa.it/en/international-relations](https://www.sissa.it/en/international-relations)) although it needs to be made better known with greater visibility in SISSA.

Coordinators are invited to advise foreign students of the existence of this service. The secretariats are invited to make web resources more intelligible and offer better assistance to foreign students. It would also seem appropriate
to offer English language courses to secretariats in order to reduce the language barrier.

**Poor knowledge of services**

An important issue found by the committee is students' lack of knowledge about services offered by the School, with 57% unaware of the existence of a housing office and 80% unfamiliar with the office of technological transfer. It is particularly disturbing that barely 30% of students know about the services offered by the CUG and the ombudsperson, designed precisely to highlight problems and help students to deal with them successfully. From 2020 to 2021, the number of students who stated they were aware of the CUG has actually fallen from 34% to 30%. As free comments in the questionnaire confirm, the explanatory emails sent out by both the administration and the PhD coordinators have clearly not been sufficient.

_The committee suggests that the school implement a comprehensive information strategy regarding these services and ensure that students be made aware of them, for example through a nominal test similar to the one carried out to test knowledge of security measures._

*It also recommends creation of a short (<5 min) “Welcome to SISSA” multimedia video (edited by SISSA MediaLab or the SISSA Communication Office) highlighting essential services.*

*Finally, the Committee recommends updating of the students' wiki page https://wiki.sissa.it/students/index.php/Main_Page to include more information on the structure of the supervisory authorities and how they can be accessed.*

**Ineffective networking**

Significant critical networking issues remain, as highlighted in the Committee's previous report. For an disturbingly high 60% of fourth-year students the PhD programme has not been effective for developing a contacts network. Unfortunately, this very important parameter has worsened compared to last year, when the dissatisfaction level was 53%. Currently, 46% of students state that they completely ignore group activities in other areas. This parameter is again worse than previously, when the corresponding figure was 37%. There are no significant differences in the answers to these questions from different PhD programmes (Z-score = 0.64). The free comments contain complaints that there
are few interactions even between closely related disciplines (for example Neurobiology and Cognitive Neuroscience or Statistical Physics, Biophysics and Condensed Matter). As discussed in the second part of the report, some mitigation measures have already been undertaken, such as creation of a common timetable for training and seminars within the Neuroscience area. Clearly, however, these measures have not been sufficient.

The Committee repeats the recommendations of its predecessors, in particular that of encouraging jointly supervised projects between different groups and areas. It is proposed that a quantitative parameter aimed at measuring the transversality of individual PhD programmes (for example, the fraction of projects co-supervised by several SISSA Principal Investigators) be introduced, with a requirement that coordinators adopt measures to maintain this parameter at a high level.

The Committee also proposes the establishment of new “across PhD” and “across Area” PhD grants, to be awarded explicitly for interdisciplinary projects that must be supervised by 2 Professors from different PhD programmes and different Areas.

**Educational offer**

The quality of education is considered **high or very high by almost all** students (92%). However, the free comments record predictable and understandable difficulties in following online courses, and problems with the quality of remote training. Teachers are well aware of these difficulties, and reports from individual PhD programmes indicate a strong commitment to provide the best possible service.

*The Committee recommends building on experience gained, and proposes a dedicated survey among students to identify the most effective teaching tools in terms of interactivity.*

Analysis of the less uniform responses from individual PhD students to questions about teaching (Figure 5), indicates that students of Cognitive Neuroscience, Geometry and Mathematical Physics, Neurobiology and, to a lesser extent, Statistical Physics consider the educational offer incomplete (Z-score = 2.5). There was a notable lack of data from the Jumbo (no longer active) and Genomics PhD programmes, none of whose students completed the questionnaire.
We invite coordinators of the PhD programmes in question to investigate the reasons for a negative perception of the current educational offer.

![Figure 6: Perception of educational completeness, first year students.](image)

However, the PhD programmes are generally considered useful or very useful by students for strengthening their scientific development, although with statistically significant differences ($Z$-score = 4.2) between various programmes (Figure 6) The Neurobiology and Cognitive Neurosciences PhD programmes are considered of little or no use by a significant number of students.

![Figure 7: Perception of the educational usefulness of the courses, final year students.](image)

Significant differences emerged ($-Z$-score = 1.9) with regard to course quality. Some critical issues are seen in the Geometry and Mathematical Physics,
Neurobiology and Cognitive Neuroscience programmes (Figure 7). Significant differences (Z-score = 2.6) are also apparent in course logistics.

![Figure 8: Perception of course logistical quality, students attending in 2020/21.](image)

Differences in these very important parameters compared to the previous year are discussed in the second part of the report for PhD programmes affected by critical issues.

**Quality of supervision and job prospects**

Answers to questions on the quality of supervision indicate that 20% of students complain of far too little contact with their supervisor (compared to 15% in the previous year) and 15% complain of insufficient feedback (10% in the previous year). Supervision is viewed as quite unsatisfactory by 14% of students (9% in the previous year), and 2% consider it totally unsatisfactory (no change). This indicates a substantial negative trend in these parameters. These issues seem to be fairly evenly distributed across the various PhD programmes (low Z-score) except with regard to the question “Was your supervision helpful in guiding your search for a position after SISSA?” (Z-score = 3.3; Figure 9). Some minor issues are apparent here for the Applied Mathematics & Mathematical Analysis, Astrophysics and Cosmology PhD programmes, plus an important one for Molecular Biology.
Free comments reveal that some Principal Investigators meet students less than once a week, and only on explicit request. In some cases, students complain that they have effectively been left to fend for themselves. Although these are a minority of cases, they are unacceptable in a school of excellence, and should be identified and resolved using appropriate tools, such as the ombudsperson. In addition, some students believe that they achieve too few publications by the end of their doctorate to be competitive in a future academic career.

A final critical element is that 47% of final year students have already decided to abandon academic life, with little variation between programmes (Z-score = 0.5). We realise that such decisions arise from the existence of professional alternatives that are equally prestigious and certainly less risky (e.g. industrial research). However, SISSA's main vocation has always been research training, and the Committee therefore considers this a worrying figure, given that the corresponding figure was 34% in the previous survey.

The same methodological approach has been used to analyse the School's three Areas and the individual PhD programmes of each, with the sole aim of identifying critical issues.
Physics Area

ASTROPARTICLE PHYSICS

Specific critical issues: There was a 44% response rate to the questionnaire from this PhD programme students, the lowest recorded in currently active programmes. Questions on teaching quality received only 2 responses. A further reason for concern is the fact that at least 10% of students complain of somewhat poor wellbeing.

Corrective measures: The report highlights teachers' awareness of the networking and internationalisation problems, with possible suggestions for students (for example the possibility of applying for Erasmus funding). It is worth noting that the 3-term system, with foundation courses in the first two terms and topical courses in the third, is seen positively by students.

The Committee considers the corrective measures taken on teaching to be appropriate, but invites the coordinator to investigate the reason for low response to the questionnaire

ASTROPHYSICS AND COSMOLOGY

Specific critical issues: It should be noted that 3 out of 5 students who answered the question considered their supervisor to be of little help in deciding on a post-PhD career. This issue also arose last year.

Corrective measures: The report highlights awareness among college teaching staff of certain problems common to all PhD programmes (low student response to the questionnaire and networking). It is clear that seminar and networking activities have been quite intense, despite the pandemic. The coordinator has suggested that supervisor non-involvement in deciding on a post-PhD career could be a sign of scientific maturity and independence.

The Committee considers the measures taken by the teaching staff to be appropriate and suggests that the issue of the supervisor's role in guiding decisions on a post-PhD career be explored further.
Physics and Chemics of Biological Systems

Specific critical issues: One of the six students who responded to the question considers that the courses provide inadequate training. One of three students states that their supervisor has not been helpful in finding a post-PhD position. These figures show no statistically significant difference from those of the previous year (Z-score <1).

Corrective measures: The PhD teaching staff have promoted extracurricular training activities for students and encouraged both students and postdocs to take part in scientific initiatives outside the PhD programmes. Some interesting initiatives are noted in this regard, such as internal seminars to present thesis projects, and the registration of the coordinator and a student on the mailing lists of other PhD programmes to receive information on possible initiatives of interest.

The Committee considers the measures taken by the teaching staff to be appropriate and suggests that the issue of the supervisor's role in guiding decisions on a post-PhD career be explored further.

Statistical Physics

Specific critical issues: One student in three who responded to the question considered the educational offer of the PhD programme to be inadequate. No other particular critical issues emerge from the answers. A significant improvement is apparent in the perception of supervisor helpfulness in deciding on a post-PhD career (down from 2 students dissatisfied to none).

Corrective measures: Training has been reorganised with the classification of courses into three groups: A (basic and mandatory), B and C (optional).

The Committee considers the measures taken by the teaching staff to be appropriate.

Theoretical Particle Physics

Specific critical issues: There are no significant critical issues. The PhD students complain of cases of discrimination. One of the 5 students who responded to the question stated that the supervisor was not helpful in the search for a post-PhD position. These figures show no statistically significant differences from those of the previous year.

Corrective measures: The report does not identify any particular corrective measures.
The Committee is concerned about cases of discrimination revealed by the questionnaire and invites the coordinator to investigate further.

THEORY AND NUMERICAL SIMULATION OF CONDENSED MATTERS
Specific critical issues: There are no significant critical issues. A significant improvement is apparent in the perception of supervisor helpfulness in deciding on a post-PhD career (from 2 students in 5 dissatisfied to none in 5). Almost 40% of students report working more than 8 hours a day on average. There are complaints from PhD students of instances of discrimination.

Corrective measures: The Teaching Board has changed the teaching structure, introducing an intermediate cycle (in the January-February period) between a first trimester (October-December) of basic courses common to all students and a third cycle (March-May) of advanced courses. The report indicates that this proposal has been implemented with the cooperation of the students, who have given positive feedback.

The Committee welcomes efforts to improve teaching, but is concerned about the cases of discrimination revealed by the questionnaire and invites the coordinator to investigate further.

Mathematics area

APPLIED MATHEMATICS & MATHEMATICAL ANALYSIS
Specific critical issues: The only cause of moderate concern relates to the search for a post-PhD position: 3 out of 7 students consider supervisors unhelpful and uncooperative in this task. This parameter was already negative in the previous year, with 4 out of 9 students complaining of the same problem. There is greater perception of the usefulness of the courses (2 out of 6 students dissatisfied last year, none out of 4 this year).
Corrective measures: The report recognises adequate awareness in the teaching staff of the networking and internationalisation problems. With regard to networking, the PhD programme has supported the activities of the Society for Industrial and Applied Mathematics (SIAM), which organises dissemination activities, colloquiums and seminars, and supports various types of events (summer schools, joint events with other SIAM students of the world, etc). SIAM activities help students to achieve a better international positioning, and many have found post-doctoral positions through its collaboration network. We also note the meeting held by the two Mathematics Area PhD programmes, GMP and AMMA, in March 2021. The educational offer has been upgraded with two new courses, while the Committee has identified no related critical issues.

GEOMETRY AND MATHEMATICAL PHYSICS

Specific critical issues: The questionnaire revealed some cause for concern regarding course quality. Three of the four students who responded consider the educational offer incomplete and the course logistics poor. Last year only one of 6 students was dissatisfied. This represents a very significant Z-score of 3.

Corrective measures: The annual report devotes considerable attention to the internationalisation problem: a third of the students are international, rather more than the SISSA average. There is also an effort to update the offer with some new courses (for example "Noncommutative geometry 2", "Localizations in enumerative geometry", "From 3-manifolds to invariants to number theory", "3-manifolds", “Log Calabi-Yau surfaces and mirror symmetry”, and “Topics in mirror symmetry”). The committee hopes that these measures will help to increase student satisfaction with the teaching offer, which is currently a critical issue. A combined encounter with the Area's other PhD programme has been organised to encourage networking.

The Committee considers the corrective measures applied to teaching to be appropriate, but nevertheless invites the coordinator to investigate the reasons for the rise in negative perceptions of course quality. Furthermore, the teaching staff is invited to undertake additional measures to promote the creation of collaborative networks.
Neuroscience Area

Analysis of questionnaire responses indicates that satisfaction with teaching quality is lower than the SISSA average in all three PhD programmes. This problem was evident from analysis of previous questionnaires and the teachers board has already implemented some corrective measures, described below. However, these do not seem to have been effective. The committee has discussed at length the reasons for the persistence of this critical issue, and has also consulted the student council and some of the Area teachers. We report some of the points arising from this discussion.

- Some teachers make the point that an essential part of the Area's teaching is provided through daily laboratory experience involving interaction with Principal Investigators and more senior colleagues. Such learning cannot be obtained in lecture rooms and is highly specific to the nature of each student's project.

- Some of the teaching staff have also noted that there is an intentional quantitative difference in the frontal component of courses evaluated by first year students: roughly 15 hours per course in Neurosciences compared to 30-40h+ hours per course in other areas.

- Teachers and student representatives hope that teaching in the Area's doctorates will be strengthened quantitatively and qualitatively, with a balance sought between the acquisition of knowledge through face-to-face lessons and experimental research, respectively.

- Another shared hope, highlighted in the Coordinators' reports, is for greater integration of the area's doctoral courses, which in fact show considerable overlap of interests and topics.

- Students would like courses focused on statistical analysis, programming, and image analysis, as these techniques lend themselves to systematic presentation. They do not consider the use of online material satisfactory, with topics often presented too superficially. An example of a course with an appropriate level of detail is “Statistics for Neuroscience”, given by Dr Michele Allegra of Padua University.

- Neurobiology students welcome the proposal to launch a club journal in their PhD programme, attaching importance to continuous exposure to topics related to their individual research programmes.

- Students throughout the area appreciate the creation of a unified timetable, and hope that course timetables will be structured to minimise clashes.
Finally, they look forward to greater efforts by teachers to strengthen the interactive and "hands-on" component of the courses.

The Committee is pleased that a constructive debate has begun between teachers and students, and hopes that the discussion will continue after the presentation of this report, with a view to achieving an agreed action plan.

COGNITIVE NEUROSCIENCES

Specific critical issues: PhD students express a lower level of satisfaction than the SISSA average: 4 of the 6 students who responded consider the PhD educational offer incomplete, judging their courses to be of little use and of poor quality. This result is significantly worse than last year's, when one student in 4 was dissatisfied (Z-score of 2.4). The perception of the limited usefulness of the courses is widespread, with 3 out of 6 third-year and fourth-year students considering the courses to be of little use. This result does not differ significantly from last year's. On the other hand, a significant improvement is seen in the perception of supervisor helpfulness in deciding on a post-PhD career (from 3 students in 4 dissatisfied to 1 in 5 (Z-score 2.8).

It is disturbing that nearly 20% of students report having experienced instances of discrimination.

Corrective measures: The annual report shows the teaching staff to be aware of the critical issues around teaching. To expand the educational offer, new courses in programming, statistics and machine learning, and microcontrollers) have been set up, and students have been encouraged to take courses in other areas. With regard to networking, unfortunately a critical issue in all PhD programmes, initiatives have been launched with the aim of promoting interaction between students, postdocs, professors (including some from other courses and areas), visitors and collaborators: (i) a live "inter-PhD" journal club (currently on Zoom); (ii) a series of invitations to external speakers for seminars (6 from June 2021) managed and organised entirely by students; (iii) the organisation of 3 international summer schools at SISSA; (iv) the organisation of a Welcome day for new students, with participation by international speakers.
The coordinator is invited to investigate, with the utmost discretion, the issue of discrimination, which in our opinion is a critical issue that must not be overlooked.

FUNCTIONAL AND STRUCTURAL GENOMICS; MOLECULAR BIOLOGY (JUMBO)

Specific critical issues: A specific issue of this PhD programme is the insufficient level of student response to the questionnaire. None of the Genomics students answered questions about course quality, and just 23% of Jumbo students responded to the questionnaire. It should be noted that all 3 Jumbo students who answered the question considered the supervisor to be of little help in deciding on a post-PhD career. By contrast, the 3 Genomics students who answered the same question found their supervisor helpful. Given the low level of response, it is not possible to detect significant trends compared to last year.

Corrective measures: As mentioned above, it is not possible to assess student satisfaction with the educational offer, however it should be noted that the teaching staff have decided to enable students to follow courses of other Areas and PhD programmes (and also other institutions). In addition, two new courses on neuronal differentiation, model organisms, epigenomics and epitranscriptomics have been introduced. With regard to networking, external collaborations continue to grow in number, and at least a third of students are involved in collaborations with other laboratories (within or external to SISSA). Despite the current travel restrictions, the aim is to restore the positive balance of the previous two years, when around one third of students had completed a period of work in an outside institution.

The Committee considers the low student response to the questionnaire a worrying sign, and invites the coordinators to investigate the reasons for this.

NEUROBIOLOGY

Specific critical issues: The questionnaire revealed low satisfaction with course quality, considered poor by all 3 students who answered the question, while 7 out of 10 students consider their courses to be of little use for their professional development. This figure is worse than last year's, which showed dissatisfied in 3 students out of 6 (Z-score 1.3).
Corrective measures: Regarding dissatisfaction with the educational offer, a problem already highlighted by the previous questionnaire, the Coordinator has held a meeting with all the students and their representatives. This has led to identification of certain corrective measures: (i) the offer of access to all Area courses, planned in a single timetable; (ii) a proposal to establish an Area journal club; (iii) a proposal for internal seminars to allow all Area personnel to present their work.

In regard to networking, a series of online seminars has been organised for spring and summer 2021, with students able to spend time afterwards with the external speaker. A second “Welcome Day” for new students has been held with international speakers present. When pandemic restrictions are eased, students can expect to have the opportunity to invite speakers to lunch or dinner for further discussion. However, the use of funds for these purposes seems likely to meet administrative restrictions, for which a speedy resolution would be welcome.

Finally, students have been encouraged to use funds available for visiting other laboratories and thus developing their own collaboration networks.

*The Committee supports the coordinator’s proposal to allocate funds to enable students to organise social events welcoming international visitors.*