



# ST. XAVIER'S COLLEGE

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❖ **Minutes and/or Resolutions of Board of Studies meetings held in the last five years for:**

- **Department of Zoology**

Programme/s: 1. BSc Zoology

- **Summary**

Academic Year	Dates of BoS	Revision in syllabus
2018 – 2019	20-04-2019	✓
2017 – 2018	08-03-2018	✓
2016 – 2017	-	x
2015 – 2016	26-03-2016	✓
2014 – 2015	17-03-2016	✓



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**2018 - 2019**



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**Meeting of the members of the Board of Studies in  
Zoology held on Saturday 20<sup>th</sup> April 2019 at 12:00  
p.m. in the Board room of St. Xavier's College.**

Name	Designation	Signature
Dr. Smita Krishnan	Head, Zoology Dept.	
Dr. Jagdish Mehta	V.C. Nominee	
Dr. Saroj Ghaskadbi	Non-parent University Subject Expert	
Dr. V.S. Desai	Non-parent University Subject Expert	
Dr. Roshan D'Souza	Subject Expert	
Dr. Madhuri Hambarde	Faculty	
Dr. Pushpa Sinkar	Faculty	
Mr. Conrad Cabral	Faculty	
Dr. Sujata Deshpande	Faculty	 20/4/19
Dr. Aldon Fernandes	Illustrious Alumnus	
Dr. Sandeep Pawar	Industry Professional	



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## Minutes of the Meeting of the Zoology Department Board of Studies 2018-19

Date: 20<sup>th</sup> April 2019

Time: 12 noon

Venue: Board Room

The meeting began with an introduction of Dr Jagdish Mehta (the new V.C. nominee) to the members of the Board. The minutes of the previous meeting were passed by the Board.

For the benefit of Dr Jagdish Mehta, Mr Conrad Cabral presented the undergraduate syllabus to the Board.

**SZOO0101.** Dr Krishnan drew the attention of Dr Mehta to the fact that the special topics (usually done in S.Y.B.Sc. in the Mumbai University syllabus) had been incorporated into the F.Y.B.Sc. syllabus. She suggested a change in terminology for the practical – 'Mounting of spicules of sponge' to 'Study of spicules of sponge'. She also explained the rationale of introducing 'Field trips' for students in every semester. Dr Aldon suggested two new places where students could be taken for field work – Uthan and the rocky shore near Nariman Point (entry from Geeta Nagar) during extreme low tides.

**SZOO0102.** Dr Adon enquired whether Drosophila Genetics was being taught in this course. He also suggested using the Animal House for the same. Mr. Conrad informed him that the topic was done in detail in the S.Y.B.Sc course. Dr Pushpa and Dr Sujata both added that they planned to use Drosophila as a model in their M.Sc courses on Toxicology and Development Biology respectively. Dr Aldon also proposed using mosquito larvae which was easy to breed, as an experimental model. Dr Krishnan drew his attention to the college being in the vicinity of the Municipal Headquarters, and the liability of surprise checks being carried out, which might put the department and college in trouble. Mr Conrad informed the Board that a scientist from Godrej industry's Pesticide division had contacted the department for preliminary testing work on mosquitos (CDC bottle assays). Dr Aldon advised the Board that an opportunity like this should be used to the fullest as Godrej Industry was known for its philanthropic gestures and outreach programmes. He also recommended contacting DBT and taking on BCIL students under the scheme.

**SZOO0202.** Dr Aldon proposed addition of affinity chromatography to this course, as affinity and ion exchange chromatography were basic requirements in the industry. Dr Madhuri replied that she had introduced it in her M.Sc course on Bio-techniques and Instrumentation. Dr Jagdish commented on the reduction of practicals in this course – Dr Madhuri explained that the number of days for conducting practicals were less.

Dr Aldon enquired whether any Antigen-antibody work was being done in any course and whether the students were familiar with ELIZA. Mr Conrad stated that these were costly and difficult to obtain, in response to which Dr Aldon offered to help out in this matter if students could be sent to pick up the same. Mr Conrad added that ELIZA was done as a practical in the course SZOO0602.







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**SZOO0302.** Dr Aldon enquired whether the software CombiStats was used and whether it was useful. Dr Sujata replied that she had used Excel and not CombiStats as the former is easily available to all the students, students start with it before going to any complicated one and the latter is costlier and hence wasn't used. As Aldon had suggested last time, she tried using ELIZA data for ANOVA with the students but it was difficult to do as they had just started using ANOVA. Dr Aldon requested her to send him the ELIZA data so that he could help out and solve her problem. Dr Krishnan stated that the visit to CREMERE be deleted as the research institute had been shut though the school for Down's syndrome children was still functional. Dr Aldon suggested visiting the laboratory of Dr Das at NIRRH and to also check out the Somaiya Research Centre.

**SZOO0402.** Dr Aldon made a query regarding the tissue culture practical in this course and suggested that a camera could be used to project the cell culture being done. He recommended studying the impact of different media on cell culture. He proposed that a practical on identification of different types of cancer slides be added for the topic on 'Cancer'.

**SZOO0403.** Dr Pushpa informed the Board that she was planning to introduce a practical on preparation of various dilutions. Dr Aldon stressed the importance of serial dilutions and suggested that it be added in 10PR. He enquired whether identification of coral fish was taught under the topic of 'Fisheries'. He suggested that a fishing trip be arranged for the students and that the students could practise their identification as the catch was being segregated on the trawler. Dr Jagdish said that while the idea was good, feasibility of organizing such a trip was minimal, as obtaining permissions was difficult. Dr Krishnan informed the Board that several years ago an Honours programme on fish identification using Day's volumes was run for a couple of years but was discontinued as the condition of the preserved fish deteriorated with the students handling them and constant replenishment was required. Dr Aldon suggested taking the students to Shrivardhan and Harihareshwar as the catch there is worth examining.

**SZOO0501.** Dr Aldon proposed introduction of a case study of coral conservation (use of 3D printed structures immersed underwater to enhance coral polyp settlement) under the broad topic of Conservation Biology.

**SZOO0502.** Dr Jagdish expressed his interest in the content of the Astrobiology course, to which Dr Sujata gave a brief description of the same. He also made a query whether the students were given hands on training in performing subcutaneous, intradermal, intraperitoneal injections on rats or mice. Dr Madhuri replied in the negative as these would require Animal house facilities. Mr Conrad informed the Board that he explains the terms when he covers the topic on 'Vaccines'. Dr Aldon recommended taking the students to NIRRH / Jai Research Foundation for the same, while Dr Jagdish said that the Veterinary Hospital at Parel would also oblige in this matter.

**SZOO05AC.** Dr Aldon enquired whether the Lac industry was relevant today in terms of export from India. Dr Jagdish claimed that India earned a sizeable amount of revenue from



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the export of lac and hence this justified retaining the topic in the syllabus. In commercial Entomology Dr Aldon recommended addition of the use of Trichoptera larvae in jewellery industry, the practise of pouring molten aluminium into ant nest and termite mounds and disposing the resulting structure as art pieces, as innovative uses of insect architecture. He reiterated that a practical on mosquito culture be added if the Godrej tie-up came through.

SZOO0601. Dr Aldon asked whether under the topic of Histology any discussion of types of cancers of the glands was done. Dr. Pushpa replied in the negative. Dr Jagdish informed the board that hospitals would very willingly part with cancer slides as they have them in plenty. Dr Madhuri said she would deal with it in her M.Sc course

SZOO0602. Dr Jagdish recommended that a topic on 'Cells of the immune system' be added in this course. Dr Aldon recommended introduction of the following topics – vaccines and anti-vaccines, use of Mercury compounds in vaccines and its removal, painful and painless vaccines (use and misuse), immunotherapy, and vaccines for cancers. He also proposed introducing a practical on Western Blotting as there are Indian companies that make the membranes hence the cost is not exorbitant.

SZOO06AC. Since this course deals with applied Entomology, Dr Aldon suggested introduction of topics like use of spider web in pesticides, use of shark skin in burn victim healing, shark cartilage for preparation of gelatin. Mr Conrad explained that since the paper dealt with commercial / applied Entomology, he restricted what he taught to those examples pertaining to insects for his topic on 'Biomimicry'. Dr Pushpa informed the Board that she could cover some of the suggested topics under 'Uses of Fish' in her course on Fisheries in the fourth semester.

## Preliminary discussion on Draft M.Sc Zoology Syllabus (Semester I to IV)

Dr Aldon wanted to know whether the course would be by research or by papers and the proposed specialization. Mr Conrad stated that though the course would be by papers there would be a research component in the second year in the form of a research project/dissertation that is compulsory.

SZOO0701. Dr. Aldon suggested that the content in topic on Evolution could be increased.

SZOO0702. Dr Aldon proposed that a topic on hormones - their use and misuse in hormone treatment, and hormone industry. Dr Aldon suggested that the students be sent to other institutes that are better equipped for practicals that cannot be conducted in the department. When Dr Madhuri brought up the issue of payment for such events, Dr Aldon suggested they be considered under the heading of field visits. Dr Jagdish suggested culturing of *C.elegans* in the laboratory as it was easy to maintain.

SZOO0703. Dr Aldon informed the Board about the 'Filtration schools' companies like Merck and Sartorius organize for the industry and suggested that the students be sent for such events to learn 'Filtration techniques'. Scientists from BARC and IIT could be invited to teach and conduct Microarray practicals. Dr Aldon requested Dr. Madhuri to change the term 'laminar air flow' to 'Biosafety – Levels 1,2 and 3' whichever is applicable. He advised that





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topics on instrumentation (centrifugation, spectrophotometry and, microscopy) should be dealing with high end instruments, as the older ones have been dealt with at the undergraduate level. He also questioned the need to incorporate instruments like autoclave, heat sterilizer and water-bath in a post graduate syllabus. He advised the department to collaborate with Sophia College which has the latest microscopes.

**SZOO0704.** Dr Aldon suggested addition of topics like 'Autoimmunity' and 'Use of stem cells' to this course. Dr Sujata said that she could include 'Stem cells' in her course on Developmental Biology in the following semester, while Mr Conrad said that he had included 'Autoimmunity' in his paper on Immunology in the next semester. He also said that the practical course for this paper needed to be revamped.

**Discussions regarding the Project / Dissertation for the M.Sc. Zoology (Part II) course.**

When could the research project begin? 5<sup>th</sup> semester and it should be completed by the 8<sup>th</sup> semester. Literature survey could begin in the 3<sup>rd</sup> semester itself.


Marks – 200

Effort, Presentation and Defence – 120 marks

Literature survey, Formulation and Thesis – 80 marks



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**2017 - 2018**



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**Meeting of the members of the Board of Studies in  
Zoology held on Thursday 8<sup>th</sup> March 2018 at 2:00  
p.m. in the Board room of St. Xavier's College.**

Name	Designation	Signature
Dr. Smita Krishnan	Head, Zoology Dept.	
Dr. Mrinalini Kagwade	University Representative	
Dr. Madhuri Hambarde	Senior Teacher	
Dr. Pushpa Sinkar	Senior Teacher	
Dr. Roshan D'Souza	Subject Expert	 8/3/18
Dr. Vinod Narayane	Subject Expert	 8/3/18
Dr. Rohan Arthur	Subject Expert	
Dr. Aldon Fernandes	Industry Professional	 8/3/18
Mr. Hans Athaide	Industry Professional	
Mr. Pradyut Rao	Student Nominee	
Mr. Amartya Mitra	Student Nominee	



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## MINUTES OF THE BOARD OF STUDIES MEETING

Date: 8<sup>th</sup> March 2018

Venue: Board Room

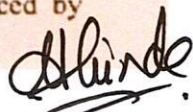
The meeting began at 2.00 pm. A copy of the minutes of the previous meeting was given to the members of the Board and the same was passed by the members of the Board. The files containing the new syllabi were given to the members of the Board. The new member Dr. Vinod Narayane and the two new student members, Mr. Pradyut Rao and Mr. Amartya Mitra of the Board were introduced to the other members of the Board. Dr. Krishnan informed the Board that the new University Nominee, Dr. Mrinalini Kagwade had conveyed her inability to attend the meeting due to unavoidable circumstances and had further requested the Board to conduct the meeting in her absence.

Mr. Conrad Cabral with the permission of the board began with presentation of the syllabi and the proposed changes in the new syllabi.

- Dr. Krishnan explained the need to include field trips for each semester in the syllabi to facilitate obtaining parental permission for the same. A query regarding evaluation of the field trip was made by the Board. The explanation given in response to this was that the field trip in some semesters were evaluated while for the long excursions, the cost and the inability to procure parental permission prevented such trips from being evaluated. The Board suggested that the venue of the field trips need not be specified in the syllabi to grant more flexibility to the department while planning field trips.
- Dr. Narayane proposed the inclusion of the mounting of appendages of prawn in S.ZOO.1PR. This could not be considered currently, since no cultured prawns are easily available in Mumbai.
- Dr. Roshan suggested that the number of lectures in S.ZOO.1.02 for each unit remain the same, to enable fair evaluation of all units.
- Dr. Narayane had a query regarding genetics practicals in S.ZOO.1PR. Dr. Roshan suggested the use of Drosophila flies in genetics for identification. Mr. Conrad clarified that Drosophila has been a part of the second year practical course and thus could not be introduced at the first year. Also the co-acervates was tried for one batch, based on a protocol taken from a biology book. But that practical did not work as per the given protocol, hence it was removed from the syllabus the subsequent year.
- In S.ZOO.2.02 Dr. Roshan enquired about the relevance of Hydra as a model depicting the incomplete digestive system. She suggested that it be replaced by Planaria or at the least Planaria could be included along with Hydra.



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- Dr. Aldon suggested the addition of Flow cytometry in S.ZOO.2.02 as one of the Biotechniques apart from Haemocytometer. Dr. Madhuri said it used to be in Biotechnology but was removed from the syllabus as that unit was removed.
- Dr. Aldon said his intention for recommending the introduction of Flow cytometry was because it is an important technique and lot of research papers used this technique hence students would benefit from learning about it.
- The Board enquired about the methodology of conducting the practical on mounting of striated muscles.
- Dr. Roshan suggested the introduction of Biotechnology as she felt it was an important component that was missing in the syllabus. Dr. Madhuri said she would look into the possibility of addition of Biotech by reducing some component of Biotechniques.
- Dr. Roshan recommended the incorporation of examples for the practical on 'Nutritional apparatus'.
- The CIA modalities for all Semesters were clarified by the staff as this was not specified in earlier syllabii.
- Dr. Madhuri posed a query to the board whether the incorporation of Biotech would benefit the students of Zoology from a perspective of job opportunities.
- Dr. Aldon responded mentioning that knowledge of cell culture techniques and fermentation technology would greatly enhance the market value of the students.
- Changes in S.ZOO.3.02 were put before the board. They included the addition of 'Experimental Design' in Unit I and a reduction in 'Descriptive statistics'.
- Dr. Sujata explained that the reason for the change was because students had asked for more matter on correlation and ANOVA and less emphasis on mean, median, mode, and standard deviation. Dr. Aldon stressed that mere performance of statistical tests was not enough. Students should also know how to interpret the data. He reiterated his suggestion of using ELISA results to do one way ANOVA for which the software EDU combi-stats had examples. Mr. Conrad said that he would incorporate that in TY as they have ELISA as a practical in T.Y.B.Sc.
- Dr. Aldon suggested that paper presentation should be promoted among the students so as to inculcate a better understanding of data interpretation and analysis.
- Dr. Roshan recommended that the various kinds of ANOVA that were being taught be mentioned in the syllabus. Dr. Aldon stressed the importance of Biostatistics as it has implications in Toxicity testing and analysis. He mentioned that the field of Drug toxicity has a little portion of Zoology, and a part of Toxicity. Additional knowledge of statistics would enhance the value of these students in this field.
- Dr. Aldon suggested that the Dr. Das from NIRRH could be approached to talk on FISH and Karyotyping as he works on it. Mr. Conrad agreed to the suggestion and promised to get in touch with Dr. Das and take it forward.
- Dr. Aldon recommended the inclusion of genetic disorders in new born babies as a part of the genetics course.
- Dr. Narayane suggested the inclusion of Ascaris as an example also for the practical on sexual dimorphism in S.ZOO. 3PR.



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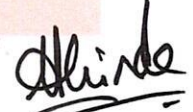


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- Mr. Conrad explained the rationale behind the introduction of a visit to the Jai Vakeel Foundation or CRÈMERE as an attempt to give students exposure understand how karyotyping is done and to interact with children with Down's syndrome.
- Dr. Roshan pointed out a typographic error in 'Development Biology' course S.ZOO.4.01 regarding genus species having no spacing.
- Dr. Roshan enquired about the practical on regeneration of hydra and Dr. Sujata specified that the department invites Dr. Ghaskadbi for a lecture on hydra and he takes the practical on regeneration of hydra.
- Dr. Aldon enquired if the students learn about transformation and marker analysis to which Mr. Conrad clarified saying that was done in T.Y.BSc
- Dr. Aldon also suggested the incorporation of NK cell and T cell cancer therapy in S.Y.B.Sc S.ZOO.4.02.
- Dr. Pushpa said that in S.ZOO.4.03 fish vaccines was added in Unit III as per suggestions of the previous BOS.
- Dr. Aldon said that we could re-look at the topic on Buffers in S.ZOO.4.03 and include Biological buffers like histidine buffers etc. to study protein structure interactions in these biological buffers.
- Mr. Amartya suggested the inclusion of animal health in S.ZOO.4.03. Dr. Aldon recommended that it be dealt with from an industrial perspective i.e. what should be the tests done on animals when they enter a farm, what are the possible diseases and how to prevent them, how do you certify an animal suitable for various needs.
- Mr. Amartya also suggested the introduction of Fresh water fisheries.
- Dr. Roshan said that crafts and gears cannot be done away with, to which Dr. Pushpa responded that she would cover all the crafts and gears in the practicals and would reduce the theoretical components of the same.
- Dr. Pushpa told the Board that acting on the suggestions given by the students the practicals on Henderson Hasselbalch and titration curves of strong acid and strong had been deleted. This was a repetition from F.Y.BSc chemistry hence the request was made.
- Dr. Aldon recommended the introduction of Chemiluminescence and Florimetry in practicals along with colorimetry. Dr. Pushpa enquired if the same could be done in T.Y.B.Sc instead of S.Y.BSc.
- Dr. Aldon suggested the addition of a topic on use of fish skin in wound healing in Fisheries unit III of course S.ZOO.4.03.
- Mr. Amartya the student member put forth a proposal for introducing a 6 unit course in Zoology. The Board said it was a good suggestion but there were hurdles in terms of space, permissions and new staff recruitment, apart from the course becoming unaided.
- In S.ZOO.5.01 Mr. Pradyut suggested the removal of Rapid Field test from S.ZOO.5PR and the board agreed to the removal as the same practical was conducted in Botany practicals.
- In S.ZOO.5.02 the changes were presented before the board and explained by Dr. Madhuri. The changes in Unit I were: Removal of Gas Exchange across respiratory



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surfaces, Diffusion, Models of gas exchange; The topic titled 'Fluid composition of blood' was renamed as 'Composition of blood'; Removal of Solids, Erythrocytes and Haemoglobin, Leucocytes and Thrombocytes; Modification of the terminology for 'Physiological regulation of gene expression by proteins' to 'Signal transduction'.

- In Unit III the changes were: Removal of Hormonal control of water, pH and ionic balance.
- Dr. Aldon enquired whether any examples could be given with reference to change in physiology of animals due to climate change and Dr. Madhuri said she deals with the same, in the form of examples in the topic of 'Signal transduction and its effects on metabolism'.
- Mr. Pradyut suggested reduction of emphasis on the topic 'Signal transduction' and expansion of the topic on 'Size and Scaling'. Dr. Madhuri said that she would need to delve into detailed physics if she went into greater depths of the topic. She also felt that the students do not possess the required physics background for such a topic.
- The title change of S.ZOO.5.AC was discussed with the board and passed by it. The reason for the shift was explained to the board (the new policy of the college to make AC choice based in both the semesters).
- The changes in S.ZOO.5 AC in Unit II were: Addition of 'Effect of environment on Insect development and behaviour'. In Unit III, Blister beetle and Cochineal bug were added in 'Insects of commercial importance'.
- Unit 4 was changed completely and was renamed 'Social life of insects' in which Honey bee, Termite and Wasp were introduced.
- The New practicals in SAC.PR were put before the board and the same were approved. They were: Insect products, Castes of social insects, Dissection of cockroach nervous system and mounting of spiracles, study of haemocytes in cockroach haemolymph and Model making or Project.
- The board was assured that for cockroach dissections the department would be using preserved and not live cockroaches.
- The department put before the board the conditions for accepting students in the 6<sup>th</sup> semester for the applied component course. The conditions agreed upon were
  - i) They should have basic knowledge of insect taxonomy
  - ii) They should have done at least 4 semesters of Biology at the undergraduate level.
- In course S.ZOO.6.01 the word 'specific activity' was added for GOT and GPT.
- Mr. Pradyut asked the Board whether it was possible to do varying inhibitor concentration in a similar manner as was done in varying substrate concentrations and the board explained to him the need to keep inhibitor concentration constant to obtain the required readings.
- Dr. Narayane enquired whether Varying pH could be classified as a minor practical. Dr. Aldon suggested that a comparative analysis with Acid Phosphatase and any other enzyme like pepsin or amylase could be carried out. This would make the practical longer and warrant its inclusion in the group of major practicals for the examinations.
- Dr. Aldon recommended introduction of Pharmacokinetics in Toxicology.



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- Mr. Conrad explained the changes in S.ZOO.6.02. The changes were: Unit 1 - Hypersensitivity shifted to unit 2; Addition of ELISA and Antigen Processing and Presentation.
- Unit 2-Removal of Antigen antibody interactions: Precipitation reaction, agglutination, ELISA shifted to unit 1, Introduction of Transplant Biology
- Unit 3-Removal of Vectors in RdT
- Unit 4-Removal of Application of RdT
- Practicals - Introduction of a group Research Project for 20 marks, as part of S.ZOO.6PR for the End semester practical examination.
- Dr. Aldon suggested inclusion of Adjuvants as a topic, as in the industry knowledge of adjuvants is important depending on the type of animal.
- Dr. Aldon also proposed the incorporation of 'Conjugation of proteins as a vaccine strategy' and Mr. Conrad explained that the same was covered in the topic Antigens and Haptens.
- Dr. Aldon enquired about the practical on 'Transformation' and Mr. Conrad provided the relevant details about the procedure and the vectors used.
- Dr. Narayane suggested chick limb bud grafting as a practical for Transplantation biology. He said it could be done from a 72 hours old embryo to a 24 hour old embryo.
- The changes in S.ZOO.6.AC were put before the board. They were as follows : Unit 1-Addition of : Role of wild pollinators
- Unit 2-Reduced emphasis on History and origin of Pest Control and introduction of 'Pests of Veterinary, Agriculture and Medical Importance'.
- Unit 3 - Changed from 'Economic importance of insects' to 'Insect colours and Mimicry'; Addition of: Pigment production in insects, Mechanisms and types of iridescence in insects, Mimicry, Batesian Mimicry, Mullerian Mimicry, Mertensian Mimicry and Biomimicry with relevant examples
- Unit 4 - Title of the unit was changed from 'Social life of insects' to 'Insect communication'. Following topics were added: Sound, Light, Pheromones
- Dr. Madhuri asked about the inclusion of Gecko and Kingfisher as examples in an Entomology paper. The board suggested dropping the examples as they are not insect examples.
- In S.ZOO.6.AC.PR a practical on effect of fumigants was introduced. Dr. Aldon suggested the analysis of LC<sub>50</sub> using statistics. The department said they would give it a try.
- The meeting ended at 5.30 p.m. with the members of the board signing the resolution on the new approved syllabus.



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Dr. Rohan Arthur

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Dr. Aldon Fernandes

Mr. Hans Athaide

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Mr. Pradyut Rao

Mr. Amartya Mitra

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**2015-2016**





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**Meeting of the members of the Board of Studies in  
Zoology held on Tuesday 23<sup>rd</sup> March 2016 at 2:00  
p.m. in the Board room.**

Name	Designation	Signature
Dr. Smita Krishnan	Head, Zoology Dept.	
Dr. Anuradha Patel	University Representative	
Dr. Madhuri Hambarde	Senior Teacher	
Dr. Pushpa Sinkar	Senior Teacher	
Dr. Ruplekha Ghosh	Subject Expert	
Dr. Roshan D'souza	Subject Expert	
Dr. Rohan Arthur	Subject Expert	
Dr. Aldon Fernandes	Industry Professional	
Mr. Hans Athaide	Industry Professional	
Mr. Iqbal Bhalla	Student Nominee	
Ms. Harshini Jhala	Student Nominee	



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**MINUTES OF THE BOARD OF STUDIES MEETING** (2015-16)

**Date:** 23<sup>rd</sup> March 2016

**Venue:** Board Room

The meeting began at 2.20 pm. A copy of the minutes of the previous meeting was given to the members of the Board and the same was passed by the members of the Board. The files containing the new syllabi and a copy of the proposed changes were given to the members of the Board. The new University Nominee, Dr. Anuradha Patel and the new student member Ms. Harshini Jhala of the Board were introduced to the other members of the Board.

- Dr. Pushpa informed the Board that in compliance with the suggestions of the Board, she had split the first unit of S.ZOO.1.01, and had combined the original unit 2 and 3 into a single unit, so that the final three units had matter that could be covered in 15 lectures each. She had deleted the topics 'Metamorphosis in insects, Mouth parts of insects and Insect larvae' as these topics were dealt with in T.Y.B.Sc under the Applied Component – Economic Entomology. She had changed Phylum Aschelminthes to Phylum Nematoda in adherence with the new taxonomic norms. She also informed the Board about the new specimens (Paramoecium, Hyalonema, Nereis and crustacean and echinoderm larvae) she had introduced in IPR.
- Mr. Conrad put forth his reasons for the introduction of a cursory review of 'Geological time scales' in I PR as a component of the practicals in Evolution, linking it to the fossils that are studied by the students.
- Dr. Smita drew the attention of the Board to the topic she had planned to introduce in S.ZOO.2.01 (Marine Mammals in Unit 2 as a special topic and Parental care and swimbladder in fish in 2PR). The rationale behind introducing this topic in theory was that, several marine mammal strandings have been occurring along the Indian coast and students were curious to know more about these animals.
- She also mentioned that in adherence to the suggestions of the Board, topics in S.ZOO.3.01 had been redistributed to enable equal distribution of lectures so that there was equal weightage for all topics in the question paper.
- Dr. Sujata told the board that the title of the course S.ZOO.3.02 had been changed from 'Biochemistry and Information flow' to 'Biostatistics and Evolution', keeping in mind the student representative, Mr. Iqbal's request to increase the depth of Biostatistics, given its relevance to all fields of research. The single unit on Biostatistics has been expanded into two units and transferred from S.ZOO.4.03 to S.ZOO.3.02.
- Dr. Aldon suggested using the software (combi-stats) made by EDQ. He said an initial investment of 300\$ would be required, and it had tutorials that could be



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- extremely useful for teaching / evaluating biostats. He re-iterated his suggestion of using ELIZA results to do one way ANOVA for which the software had examples.
- Dr. Roshan made a query regarding the teaching of ANOVA and Dr. Sujata replied that she had plans to introduce experimental design, which forms the basis of ANOVA, and from there teach one way ANOVA. She also informed the Board that she had introduced new practicals in 3PR (Excel and introduction to 'R') pertaining to the units on statistics.
  - Dr. Sujata mentioned that non parametric tests would be introduced as they are often used in animal behavior studies. Dr. Ruplekha wanted to know what kind of data would be provided to the students, Dr. Sujata replied that the data could be real life data collected by students or it could be fabricated. Dr. Ruplekha suggested that these tests would be useful for the students in analyzing the data of their T.Y.B.Sc projects. Dr. Sujata also mentioned that a key would be provided to enable students choose the right test pertaining to the data available.
  - Mr. Conrad added that he covers  $X^2$  test in his second year course on Advanced Genetics S.ZOO.3.03. He informed the Board that the topic of DNA replication had been shifted from S.ZOO.3.02 to S.ZOO.3.03 as it was more relevant to Bioinformatics that forms a part of that course.
  - Dr. Sujata mentioned that in unit 3 of the course S.ZOO.4.01, she had introduced a topic on transcription and translation, in addition to a practical on transcription and translation in 4PR.
  - Dr. Pushpa informed the Board that the title of the course S.ZOO.4.03 was changed from 'Commercial Zoology and Biostatistics' to 'Biochemistry and Applied Zoology'. Two units of Commercial Zoology were converted to one unit of Applied Zoology in compliance with the views of the student representative Mr. Iqbal (reduce Commercial Zoology and increase Biostatistics). The unit of Biostatistics was shifted to the third semester as usage of Biostatistics would be in Advanced Genetics and also in the fourth and fifth semesters. A practical on 'Biometry of fish' has been introduced in 4PR.
  - Dr. Aldon suggested the introduction of a topic on fish vaccines in the unit on Applied Zoology. Dr. Pushpa agreed to add it as it would be a good addition to the existing topic on fish diseases.
  - Dr. Smita informed the Board that she had introduced a new topic in unit 4 of the course S.ZOO.5.01, titled 'Wildlife Forensics' to keep the students abreast with the technology that is used to track poachers and thus protect our wildlife. New practicals on calculation of Life expectancy using life tables and population size estimation using mark recapture method were introduced in 5PR.
  - The student member Mr. Iqbal suggested that the topic on Conservation Biology be fleshed out, emphasizing census techniques being used and including problems encountered during implementation of management strategies. Ms. Harshini was of the opinion that using Indian case studies would make the topic more relevant and interesting (Project Tiger, Turtle conservation, Rhino reintroduction in Dudhwa, Lion and Cheetah conservation and reintroduction).
  - Dr. Sujata mentioned that a new practical on 'Introduction to Telescope' was added in 5PR for the topic on Astrobiology that was introduced last year in S.ZOO.5.02. Mr. Iqbal requested that the topic on Haematology (practicals included) be dealt with in a manner that pertains more to animals than human beings. Dr. Anuradha interjected saying that this was



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- possible, as in her college they use only goat blood and the students had to know normal values / counts related to animals.
- Dr. Pushpa informed the Board that she had added a unit on Nanoscience, in S.ZOO.6.01 as this is a fairly new topic wherein a lot of research is being carried out world over. In order to accommodate this unit, she had combined unit 3 and 4 (endocrine and exocrine glands) into one single unit titled 'Histology of glands'. She had also introduced a practical on synthesis of nanoparticles in 6PR. While combining the two units she has deleted 'liver' as that would be dealt with in detail under Toxicology.
  - Mr. Iqbal drew the attention of the Board to two points:
    - a) Only 1 gland had been deleted, but the reduction in number of lectures was from 30 to 15. He suggested deleting topics like blood supply, nerve supply, embryonic development of gland etc in the topic of histology.
    - b) The study of Lac Operon in the unit of Enzymology did not seem in sync with the rest of the study of enzymes, hence he suggested deleting the topic.
  - The Board put forth their views reacting to his comments:
    - a) Dr. Ruplekha suggested that only histological structure and functions of the glands retained, be done.
    - b) Dr. Ruplekha and Dr. Roshan were of the opinion that Lac Operon was too important a topic to be deleted as a question on it, was often asked in NET/SET and other competitive examinations.
    - c) Dr. Roshan suggested that Lac Operon may be shifted to S.ZOO.4.01 in the unit of Developmental Biology.
    - d) Dr. Madhuri was of the opinion that if pituitary gland is done, no other gland needed to be done.
  - Dr. Pushpa initiated a discussion on the practical on GOT and GPT in 6PR. Dr. Roshan suggested that if rat tissue is kept in  $-20^{\circ}\text{C}$  freezer, then the enzyme activity did not drop and the same homogenate may be used for both batches, thus solving the problem of procuring rats for each batch.
  - Dr. Aldon mentioned that one could preserve the entire liver at  $-80^{\circ}\text{C}$  and the tissue could be used both during regular practicals and for exams too. He also suggested that rats could be procured by colleges from Industries having a recognized Animal House. The college could ask for the control group of animals (which are not treated) and use them for demonstrating dissections or for physiology practicals and the only mandatory document required would be a disposal clearance certificate which the same industry / laboratory could generate once the carcasses were returned for incineration/disposal.
  - Dr. Smita requested the Board to examine the copy of the Cross Faculty course that the department runs for the students of the Arts faculty of the college. She gave a gist of the three units being handled by Mr. Conrad (Evolution), Dr. Sujata (Social Animals) and Dr. Smita (Survival strategies) to the Board.
  - General nonacademic suggestions from the Board.
    - a) Dr. Roshan recommended that the Unit where the change is proposed be mentioned / highlighted in the page containing the list of proposed changes.
    - b) She also suggested inserting coloured paper flags in the final syllabi on the Resolution page that requires the signatures of the members of the Board of Studies.
  - The Members of the Board signed the Resolutions for each syllabus and concluded the meeting.







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Dr. Smita Krishnan

*Smita Krishnan*

Dr. Anuradha Patel

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Dr. Madhuri Hambarde

*Madhuri*

Dr. Pushpa Sinkar

*Pushpa Sinkar*

Dr. Ruplekha Ghosh

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Dr. Roshan D'souza

*R.D. Souza 8/3/18*

Dr. Rohan Arthur

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Dr. Aldon Fernandes

*Aldon Fernandes 8/3/18*

Mr. Hans Athaide

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Mr. Iqbal Bhatta

*I. Bhatta*

Ms. Harshini Jhala

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Meeting of the members of the Board of Studies in  
Zoology held on Tuesday 17<sup>th</sup> March 2015 at 2:00  
p.m. in the Zoology Research laboratory

Name	Designation	Signature
Dr. Smita Krishnan	Head, Zoology Dept.	<i>Smita Krishnan</i>
Dr. Veena Sahai	University Representative	<i>Veena Sahai</i>
Dr. Madhuri Hambarde	Senior Teacher	<i>Madhuri Hambarde</i>
Dr. Pushpa Sinkar	Senior Teacher	<i>Pushpa Sinkar</i>
Dr. Ruplekha Ghosh	Subject Expert	<i>Ruplekha Ghosh</i>
Dr. Roshan D'souza	Subject Expert	<i>Roshan D'souza</i> 17/3/15
Dr. Rohan Arthur	Subject Expert	
Dr. Aldon Fernandes	Industry Professional	<i>Aldon Fernandes</i>
Mr. Hans Athaide	Industry Professional	
Ms. Sanuli Paralkar	Student Nominee	<i>Sanuli Paralkar</i>
Mr. Iqbal Bhalla	Student Nominee	<i>Iqbal Bhalla</i>



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### MINUTES OF THE BOARD OF STUDIES MEETING

Date: 17<sup>th</sup> March 2015

Venue: Zoology Research Laboratory

The meeting began at 2.15 pm. A copy of the minutes of the previous meeting was given to the members of the Board and the same was passed by the members of the Board. The files containing the new syllabi and a copy of the proposed changes were given to the members of the Board. The new student members of the Board were introduced to the other members of the Board.

- Dr Madhuri then informed the Board about the changes she proposed to incorporate into the course S.ZOO.5.02. She said the rationale behind this was to facilitate the addition of a unit of Astrobiology in the T.Y.BSc syllabus and also remove topics that were partially overlapping with the course S.ZOO.5.01. In Unit 1, part A was removed but part B was retained with modifications in order to make it more generic than restrictive.
- Dr.Aldon made a query regarding the topics that would be covered under Basic and Space Biology to which Dr Sujata replied that in Basic astronomy she would cover the origin of Solar system and link its importance to Biology. There would also be a topic covering early Earth conditions and habitable zones apart from Earth in the solar system. In the last topic she said she would cover topics like SETI and search for Exoplanets. Part B would deal with how space travel affects human physiology. Dr Roshan asked for a clarification regarding the topic titled 'Revision of human physiology'. Dr Madhuri explained that since most of the physiological systems were done in F.Y.BSc, the term revision was used. Dr Sujata mentioned that as the bone, musculature, the circulatory and nervous system were most affected in space, she would revise these before going on to the changes that occur in space. Dr Pushpa informed the Board that the idea to incorporate the course into the regular syllabus came from the students' response to the Honour's course on Astrobiology which the department is currently conducting.
- Dr.Smita informed the Board that in a meeting with the mentors of the Star College, Dr.Bagchi (one of the mentors from M.S.University, Vadodara) had suggested that the Zoology Department should introduce topics like Animal Ethics and Biosafety requirements in their syllabus. She asked the Board for suggestions as to where such topics could be introduced in the existing syllabus. Dr Aldon suggested the introduction of a topic covering the basic concepts of Animal Ethics which could incorporate what happens in a private laboratory vis-à-vis a government institution, with regard to animal house maintenance. He pointed out that many colleges had lost



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their affiliation to maintain an animal house due to animal ethics issues and due to paucity of funds and lack of infrastructure, whereas the private institutions made amendments and retained their affiliation to the CPCSEA. He outlined the various topics one could incorporate in Animal Ethics, like the structure of the animal ethics committee, the CPCSEA guidelines, the permissions required and how one would proceed if a project involving animals had to be initiated. Dr Aldon suggested that the topic could be done in the semester where the practical on dissections was there but Dr Smita reminded him that dissections were banned by the UGC. She also informed him that only in 6PR a rat was sacrificed to perform a practical on liver enzymes and enquired whether that unit would be appropriate to deal with the animal ethics issue. Dr Aldon then gave two suggestions 1) deal with the topic as a special lecture taken before the start of the practicals in T.Y. (also include the general guidelines in the T.Y. laboratory manual) or 2) deal with it in the course on Commercial Zoology S.ZOO.4.03, as the topic was small and would be easily accommodated there. Dr Pushpa agreed with the second suggestion as she already covered a part of the topic when she dealt with the unit on animal husbandry.

- Dr Aldon pointed out that one important aspect that was lacking in the current syllabus was scientific paper writing. Dr Pushpa informed him that scientific communication skills had been introduced by the college for the entire science stream, and was covered during the 3<sup>rd</sup> and 4<sup>th</sup> semester. Mr Iqbal drew the attention of the Board members to the fact that issues concerning ethics in scientific writing were not dealt with in the current SCS course. Mr Conrad suggested that Dr Rajendra Shinde, Vice Principal (Science), be informed so that this lacuna could be rectified. DrMadhuri informed the Board that she had, as part of her CIA for course S.ZOO.4.02 made the students select and present research papers to inculcate the habit of reading research papers and improve their presentation skills.
- Dr Roshan made a query regarding the inconsistent distribution of lectures in course S.ZOO.4.03 and whether the same weightage was reflected in the question paper. Dr Pushpa clarified that the weightage was distributed depending on the lectures required for each topic. Dr Ruplekha stated that certain topics do not merit several lectures, and that probably was the reason for the skewed distribution pattern of lectures. Dr Roshan enquired whether under autonomy, freedom to change the number of lectures per unit was granted. She explained the University's rationale behind having equal number of lectures per unit, as a measure to give equal weightage to all units which is finally reflected in the question paper. Dr Pushpa said that she would make the necessary adjustments in syllabi and Mr Conrad explained the difficulty in complying with the one course per teacher mandate of autonomy. He informed the Board that this rule was relaxed only for the final year, wherein two teachers could share a course.







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- Dr Aldon enquired whether topics like the use of various pesticides, modes of pesticide action, insecticide resistance etc were incorporated in the syllabus. Mr Conrad replied that all those topics were covered in the Entomology course.
- Dr Pushpa asked the Board for suggestions to enhance the Commercial Zoology course S.ZOO.4.03 as she had an inkling that some students felt the course to be lengthy and uninteresting. In response to this Dr Ruplekha suggested introduction of a more relevant topic like marketing of fish, downsizing of topics like crafts and gears and deletion of topics that were repetitive. Dr Roshan suggested combining some topics (fish uses with fish preservation techniques), choosing only the most important fisheries to be done in detail, excluding the fish biology and concentrating on resource conservation. Mr Iqbal expressed concern that more time was spent on Commercial Zoology and less on Biostatistics, which to him was far more important for any student interested in pursuing a career in research. Dr Sujata suggested that the Unit on Biostatistics be revamped and dealt with in a more practical manner as this would be more beneficial for the students. Dr Aldon suggested that even an analysis of the ELISA practical that they do in the 6<sup>th</sup> semester could be done using statistics. Dr Roshan confirmed the need to rephrase and recategorize the Unit on Biostatistics as a lot of it was repetitive. Dr Madhuri felt that an Honour's course on problem based Biostatistics could be conducted by the department to generate interest in the students for the topic.
- Dr Pushpa informed the Board that she would like to introduce a topic on Nannosynthesis, either in the 4<sup>th</sup> or 6<sup>th</sup> semester and would like suggestions from the Board, as to where it would be more relevant. Dr Aldon suggested the topic be introduced in the unit of Toxicology in S.ZOO.6.01 as the use of nanoparticles to enhance or reduce LC<sub>50</sub> or LD<sub>50</sub> could be related to drug toxicity.
- Dr Aldon suggested the replacement of certain tests (bacterial agglutination, radial immune-diffusion) done in Immunology which were out-dated, by modern techniques like PCR, Immuno-electrophoresis, Principles of cell counter and FACS. He also suggested the inclusion of Adjuvants as an introductory lecture while the students were being introduced to the topic on vaccines.
- The Board asked Mr Iqbal whether he had suggestions for the courses he had already completed, and he gave the following suggestions:
- Downsizing of the two units of Biochemistry in S.ZOO.1.01 as they would be done again in the third year in Biochemistry – He was reminded that not all students were able to take Biochemistry in the 5<sup>th</sup> and 6<sup>th</sup> semester. Dr Roshan suggested doing only carbohydrate metabolism in F.Y. and completing the rest later. Dr Pushpa clarified that she only introduces the biomolecules in F.Y. and does not teach the metabolism



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of the molecules. Dr Smita suggested condensing and combining the two units instead of total deletion.

- Genetics and Evolution be done in a continuous manner without a break of a semester in between. Mr Conrad reiterated the constraints of autonomy with respect to the one course per teacher mandate which made it difficult to maintain continuity of a topic and also juggle workload schedules. Dr Madhuri suggested putting the entire topics of Genetics and Evolution in single semesters, but Dr Ruplekha interjected that combining basic and advanced Genetics into one course, done in one semester would be too heavy for the average and weaker students to handle in class. Finally Mr Conrad said that he would work on solving this problem of reshuffling courses S.ZOO.1.02 and S.ZOO.3.03.
- In the second semester while the course S.ZOO.2.01 has a unit of Ecology, they also learn the same unit in Botany, and in the first semester they do a special course on Environmental Studies which overlaps considerably with what is taught in Ecology. Dr Smita suggested introducing a unit of Animal Behaviour in lieu of Ecology, but kept her options open for any other topic that might be more relevant.
- The Board signed the syllabi and concluded the meeting



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Dr. Smita Krishnan

*Smita Krishnan*

Dr. Veena Sahai

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Dr. Madhuri Hambarde

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