

COMPLETION REPORT

DBT STAR COLLEGE SCHEME (2018 – 2021)

Submitted by



SACRED HEART COLLEGE, CHALAKUDY
Railway Station Road, Chalakudy
Thrissur (Dt.), Kerala – 680307

Tel: 0480-2701159 Fax: 0480 - 2708877
E-mail: principalshcollegecky@gmail.com
www.sacredheartcollege.ac.in

Completion Report
(27.02.2018 to 26.02.2021)

Department of Biotechnology

Proforma for submission of Completion Report supported under Star College Scheme

(Kindly note that the Completion report from Point 6 to 10, should not be more than 25 A4 size sheets, with font size 12pt and line spacing 1.5 Relevant annexure may be attached at appropriate places.

1. Name of the College : **Sacred Heart College, Chalakudy**
2. Name of Coordinator, designation, address, Phone nos.: **Dr. Nijo Varghese, Assistant Professor, Department of Physics, Sacred Heart College, Chalakudy, Thrissur – 680307. Ph: 9496805788**
3. (A) Assessment duration : **27/02/2018 to 26/02/2021** (B) Duration in years : **3**
(C) Extension period if any: **NIL**
4. Details of Departments Supported

SI No	Name of Department	Courses (B.Sc./M.Sc./PG Diploma, certificate etc) offered	Regular Faculty members	
			With Ph.D.	Without Ph.D.
			Total =10	
1.	Physics	B Sc. Physics	3	1
2.	Chemistry	B Sc. Chemistry	3	0
3.	Zoology	B Sc. Zoology	2	1

5. Number & Date of Advisory committee meeting held :-
6. Qualitative improvements due to DBT support. Please highlight 5 salient points (within 1000 words).

The major five highlights after receiving the STAR Funding

- Our laboratory infrastructure became more sophisticated with new instruments
- A new water analysis unit has been introduced in the department of Chemistry. Several water samples from outside were analyzed using the water analyzer unit
- The students of each departments got very good access to new instruments and they were able to carry out UG projects using new equipments
- Several seminars, workshops and industrial visits were conducted to refresh the staff and for the benefit of students. The staff and students have got professional and technical insights out

of these programmes

- The entrepreneurial skills of the students improved significantly after engaging with making hygiene products (cleaning materials), fish farming and dairy products making, etc.

Sl. No.	Programme	Title	Impact	Outcome
1.	Workshop	Semi microanalysis	Characterization of samples using very little amount of chemicals and reagents	Environmental safety, pollution control and cost effective method
2.	Workshop	Glass blowing techniques	It gave very good understanding how to make different types of glasswares	Broken glasswares can be easily repaired and prevent environmental pollution by glass
3.	Hands on training	Dairy products	To create own start ups in making value added products	Students were able to exhibit and sell the dairy products that they made
4.	Hands on training	DNA isolation and bar coding	Students were able to use instrumentation not available in their laboratory	Useful for their higher education in doing M Sc. projects. One of the student participant is now pursuing her research in molecular biology at IISC, Bangalore
5.	Workshop	Experimental Physics	Attention is given to experimental techniques	Helped in doing UG projects interestingly.
6.	Seminar	Career Aspects in Physics	Students were motivated towards higher education	Increasing number of students applied abroad for better prospects and employment

Minor UG projects undertaken after the STAR scheme was introduced

Sl. No.	Department	Project title	Pre-STAR scheme	After the STAR scheme introduced
1.	Zoology	Study of adulterants in different types of milk	Insufficient funds to buy chemicals	Submitted a project on adulterants in the milk collected locally
2.	Zoology	Feeding and egg laying efficiency of quail (<i>Coturnix japonica</i>)	Quail farming was difficult due to lack of funding	Sufficient number of quails are available at present
3.	Chemistry	Microwave assisted synthesis of silver nanoparticles and photocatalytic degradation studies of different fertilizers.	Difficulty in synthesizing nanomaterials using advanced techniques	Achieved more easy way to synthesize nanomaterial
4.	Physics	Studies on the efficiency of solar cells	The Difficult to do the characterization using the conventional meters	Using ExpEYES kit the study become easy
5.	Physics	Study of linear attenuation coefficient and half value thickness of various materials using G M Counter	GM Counter and samples were not available	Students were got a chance to study the nuclear sample and radiation penetration

Along with the syllabus revision several new experiments were added to the syllabus and several instruments needed to be purchased. The STAR scheme helped us to buy these instruments and so the students were able to complete the experiments on time. There was also a shortage of the number of instruments and so they had to be shared by many students making it impossible for every student to have individual practical experience in doing an experiment. In

the STAR scheme we could buy multiple numbers of instruments and so each student is now able to do the experiments on their own without any delay.

During the academic year 2018–19, the projects submitted by the students in fulfillment of their B.Sc. degree course were based on the skill enhancement programs that they had undergone in the STAR DBT scheme. In the academic year 2019- 2020 two projects titled “Physical, chemical and biological characteristics and pollution status of the Kayamkulam estuary” and “Water quality assessment of Bharathapuzha river” were also submitted as UG projects by the students.

We were also able to help undergraduate students from other colleges to complete their projects with the help of equipment purchased under the STAR scheme. The undergraduate students of the Department of Geology and Environmental Science, Christ College, irinjalakuda used the water quality probe purchased by the department of Zoology using the funds available under this scheme for assessing the water quality of well water from different locations as a part of their UG project. The water analyzer purchased under the DBT-STAR College scheme in the department of Chemistry was very helpful in analyzing the water samples of nearby houses, flats, schools, etc. The existing GM counter in the department of Physics was completely damaged during the flood in Kerala in 2018 and was able to be replaced by a new one with the help of DBT-STAR College funding.

7. Any Novel aspect introduced during the Scheme duration.

- Hand-on training on dairy farming that improved the entrepreneurial skills of the students
- Semimicro analysis was introduced in the chemistry lab as it is very much helpful to reduce the amount of chemicals used in the lab, less wastage and is a very cost effective method
- An add-on course in “Computer interfaced Physics Experiment’ is introduced to the students with practicals designed using the ExpEYES kit.

8. Lessons learnt / difficulties faced/suggestions if any, in implementation of the programme and utilization of DBT grant. (Max 3 points within 300 words).

- DBT-STAR scheme was very helpful for us to procure more sophisticated equipments and sufficient amounts of chemicals for our UG laboratories. It was possible only through DBT-STAR College funding.
- Several projects are being done by the undergraduate students and this may require using equipment whose cost may exceed one lakh. The ceiling of 1 lakh for an equipment was therefore a challenge especially when the prices exceed 1 lakh due to addition of tax.

- The second allotment and third allotment were not transferred to the college and though the departments had planned to conduct various seminars and invited lectures by experts, it was not possible due to lack of funds.

9. Key performance indicators

S. no	Indicator	Pre-support	During /After Support	Remarks
1	No. of students admitted	Total (2017-18) = 115	Total (2018-19) = 93	
		M=0	F= 115	
		SC ST OBC G	SC ST OBC G	
		0 0 0 0	10 0 24 81	
		SC ST OBC G	SC ST OBC G	
		0 0 0 0	8 1 27 57	
2	Admission cut-off %	62%	69%	
3	No. of students passing out (%) [Students Admitted/passing out (pass %)]	82% (Data based on 2015-2018 batch)	89% (Data based on 2016-2019 batch)	
4	Drop-out rates	Nil (Data based on 2017-20 batch)	1 student (Data based on 2018-21 batch)	
5	No. of students opting for MSc / M.Tech/ PG Diploma in Science	45	53	
6	Average marks	77.18% (Data based on 2017-20 batch)	75.7% (Data based on 2018-21 batch)	
7	No. of hands-on experiments being conducted	Chemistry- 119 Physics - 62 Zoology - 84 Total : 265	Chemistry- 131 Physics - 65 Zoology - 95 Total: 291	The new experiments of the 2019 revised syllabus
8	No. of new experiments introduced	Nil	Chemistry- 2 Physics - 10 Zoology - 11 Total : 23	21 new experiments of the 2019 revised syllabus were introduced
9	Publications (scopus indexed) /patents, if any.	4 (During 2015-18)	5 (During 2018-21)	
10	Training received by (A) Faculty (B) Students (Summer/ Winter Projects)	Nil	(A) 7 (B) 7	
11	Exhibitions/seminars /training courses conducted	Nil	Seminars - 7 Workshop - 7	
12	Books/journals subscribed from grants	Nil	Books: 62	
13	Outreach activities (Popular lectures)	Nil	3	

14	Colleges mentored to apply for DBT Star College grants	Nil	Nil	
15	Invited lectures	Nil	8	

- Proofs (S.No. 6-14) were given in Annexure - I.

10. Details of colleges / schools mentored during the Star Scheme Tenure (Name of college / school; class / standard; No. of students benefited; whether any mentored college applied under Star College Scheme, if yes what was the outcome.

Nil

11. Details of increase in the faculty generated resources viz extramural research grants from other funding agencies to strengthen the Star College Scheme efforts.

Nil

12. SOPs developed, lab manuals created and uploaded on website or submitted to DBT.

Laboratory SoP and policy are uploaded on the college website. Links to access the document are

<https://sacredheartcollege.ac.in/laboratory-policy-and-sop/>


https://drive.google.com/drive/folders/1LDlxhUjMtovGcR7c2p_zsE6T3EsD8PTq?usp=sharing

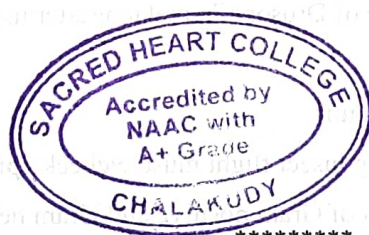
13. Self evaluation


Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics
Physics, Chemistry, Zoology	1. To enhance practical skills of students by undertaking project work and participating in hands on training programs	100 %	2
Physics, Chemistry, Zoology	2. To create opportunities for student interaction with eminent scientists to help create good scientific temper and aptitude for research through conferences and institutional visits.	75 %	1.5

Physics, Chemistry, Zoology	3. Students are encouraged to use the library for enhancement of knowledge through reading of journals with high impact factor and books of academic relevance.	40%	1
Chemistry, Zoology	4. To enhance the infrastructure for safe handling of chemicals and fire safety in chemical laboratories such as chemistry and zoology.	50%	1
Physics, Chemistry, Zoology	5. After the revision of the syllabus recently there have been added many practical techniques which need to be demonstrated to the students – however due to lack of facilities and the limited technology available a lot of such techniques are carried out by the students.	100%	2
Total (Out of 10)			7.5 marks

* For quantitative analysis you may fix five objective (max) each having 2 marks and accordingly calculate the matrix.


Course Coordinator
 (With Seal)
 Dr. Nijo Varghese




Head-of the Institution
 (With Seal)
PRINCIPAL
 SACRED HEART COLLEGE
 CHALAKUDY

Proofs for Key performance indicators**6. Average marks:**

Link to access the copies of the consolidated university mark lists.

2017-20 batch	https://sacredheartcollege.ac.in/wp-content/uploads/2022/07/2017-2020-results.pdf
2018-21 batch	https://sacredheartcollege.ac.in/wp-content/uploads/2022/07/2018-2021-results.pdf

7. No. of hands-on experiments being conducted and 8. No. of new experiments introduced

The B.Sc. syllabuses were revised in 2019 and 21 new experiments were newly introduced for the students

Physics

1. Kater's pendulum- Acceleration due to gravity
2. Verification of Thevenin's theorem and maximum power transfer theorem
3. Lissajous figures – Measurement of frequency and phase shift of sinusoidal signals using CRO
4. Single slit diffraction using LASER
5. Spectrometer-Quartz prism-Refractive indices of quartz for the ordinary and extraordinary rays
6. Resolving power of grating
7. Polarimeter-Specific rotation of sugar solution.
8. LCR circuits-Resonance using CRO
9. Photo diode V-I characteristics. Determine quantum efficiency and responsivity of the PD
10. Study the characteristics of LED (3 colours) and LDR.

Chemistry

Core course: Physical Chemistry Practical

1. Determination of the surface tension of a liquid or a dilute solution (NaCl / surfactant) using a stalagmometer (drop number method).
2. Verify Lambert-Beer's law and determine molar extinction coefficient, concentration of any one, CuSO₄ / Ferric alum / KMnO₄ / K₂Cr₂O₇ in a solution. Find out the unknown concentration of the given solution. (Five standards may be prepared).

Zoology

1. Study of diversity of eukaryotic cells – methylene blue staining of buccal epithelium and striated muscle cells.
2. Study of the polytene chromosome of *Drosophila melanogaster* using salivary gland cells of 3rd instar larva.
3. Preparation of permanent whole mount.
4. Vital staining of mitochondria using insect flight muscle/check epithelium
5. Gram staining for the identification of Gram positive and Gram negative bacteria (*Lactobacillus*)
6. Bacterial motility by hanging-drop method.
7. Methylene blue reduction test for assessing the quality of raw milk.

8. Preparation of a fungal smear – Lactophenol cotton blue staining & mounting
9. Study of the effects of Colchicine on mitosis in the root meristem of *Allium cepa*.
10. Isolation of DNA and from animal tissues.
11. Determination of Hb content in man using Haemoglobinometer.

Links to access the 2019 revised syllabus

B.Sc. Chemistry	https://sacredheartcollege.ac.in/wp-content/uploads/2022/03/B-Sc.-Chemistry-2019-onwards.pdf
B.Sc. Physics	https://sacredheartcollege.ac.in/wp-content/uploads/2022/03/Physics-UG-2020.pdf
B.Sc. Zoology	https://sacredheartcollege.ac.in/wp-content/uploads/2022/03/BSc.Zoology.Syllabus-2019-admission.pdf

9. Publications (scopus indexed).

1. Spectroscopic studies, quantum chemical investigations, and in silico and in vitro scrutiny of the diuretic drug trichlormethiazide adsorbed on AuNPs, V. Shyni, D. R. Leenaraj, Reena Ittyachan, G. J. Shyju, Lynnette Joseph, D. Sajan *Journal of Molecular Recognition*, <https://doi.org/10.1002/jmr.2939> (2021) (IF 2.12)
2. Spectroscopic, density functional theoretical study, molecular docking, and in vitro studies based on anticancer activity studies against A549 lung cancer cell line of diphenylhydantoin adsorbed on AuNPs surface, Dr. Reena Ittyachan, V. Shyni, D. R. Leenaraj, Lynnette Joseph, D. Sajan, *Physics Journal of Molecular Recognition*, <https://doi.org/10.1002/jmr.2916> (2021) (IF 2.12)
3. Anticancer activity of indapamide adsorbed on gold nanoparticles: DFT, in-silico, and in-vitro analysis Dr. Reena Ittyachan, V. Shyni, D. R. Leenaraj, Lynnette Joseph, D. Sajan, *Physics Journal of Molecular Recognition*, <https://doi.org/10.1002/jmr.2920> (2021) (IF 2.12)
4. Growth, Z-scan and density functional theoretical study for investigating the nonlinear optical properties of guanidinium l -glutamate for optical limiting applications, Dr. Reena Ittyachan, Rejeena V.Rajan, Merin Georgea, D.R.Leenaraj, D.Sajana G.Vinitha, *Physics Journal of Molecular Structure* 1222, 128937. <https://doi.org/10.1016/j.molstruc.2020.128937> (2020) (IF 3.84)
5. Experimental and theoretical studies on the bifurcated hydrogen bonded NLO active material of pure and crystal violet dye-doped L-argininium bis dihydrogen phosphate Dr. Reena Ittyachan, Jesby George, Ligi Cherian, Lynnette Joseph, D. Sajan, G. Vinitha *Physics Optical Materials*, 92, 111-124. <https://doi.org/10.1016/j.optmat.2019.04.019> (2019) (IF 3.08)

10. Training received by Faculty and Students

A) Faculty

1. 10 days training on milk products at Dairy Training Center, Alathur was attended by Dr. Tessy K.L., Dr. Sr. Betty K.P., Dr. V. Neetha and Ms. Neenu Joy of Department of Zoology.
2. 2 days training on Aquarium making on 21-22/11/2019 attended by Dr. Tessy K.L., Dr. Sr. Betty K.P., Dr. V. Neetha and Ms. Neenu Joy
3. 2 days Hands on training on DNA isolation and Bar coding on 11-12/03/2019 attended by Dr. Tessy K.L., Dr. Sr. Betty K.P., Dr. V. Neetha and Ms. Neenu Joy
4. One day Laboratory safety training programme on 07/02/2019 was attended by Ms. Maria Jose, Dr. Santhosh Paul, Dr. Laina A L, Dr. Anuja E V, Ms. Linda Tresa, Ms. and Athira Narayanan
5. One day Glass Blowing Techniques training programme on 17/01/2019 was attended by Ms. Maria Jose, Dr. Santhosh Paul, Dr. Laina A L, Dr. Anuja E V, Ms. Linda Tresa, Ms. and Athira Narayanan
6. One day Semi Micro Analysis training programme on 25/03/2019 was attended by Ms. Maria Jose, Dr. Santhosh Paul, Dr. Laina A L, Dr. Anuja E V, Ms. Linda Tresa, Ms. and Athira Narayanan
7. One day Experimental Physics training programme on 23/03/2019 was attended by Dr. Sr. Reena Ittyachan, Dr. Nijo Varghese and Ms. Fency KF.

B) Students

1. 10 days training programme on milk products at Dairy Training Center (DTC), Alathur (11-14/12/2019)
2. 2 days training on Aquarium making on 21/11/2019 attended by the students of Zoology department
3. 2 days Hands on training on DNA isolation and Bar coding on 11-12/03/2019
4. One day Laboratory safety training programme on 7/02/2019
5. One day Glass Blowing Techniques training programme on 17/01/2019
6. One day Semi Micro Analysis training programme on 25/03/2019
7. One day Experimental Physics training programme on 23/03/2019

Link to access the reports of the events.

<https://drive.google.com/drive/folders/1uVjYFe-zCuwg12uFnXU84brOcl5biCAq?usp=sharing>

11. Exhibitions/seminars /training courses conducted

Department of Physics: Seminars - 2, Workshop - 1

Department of Chemistry: Seminars - 3, workshops - 3

Department of Zoology: Seminars - 2, workshops - 3

Link to access the reports of the events.

<https://drive.google.com/drive/folders/1uVjYFe-zCuwg12uFnXU84brOcl5biCAq?usp=sharing>

12. Books/journals subscribed from grants

Link to access the copy of the invoices of the books purchased:

https://drive.google.com/drive/folders/169wIOXy_6JlakPwDRFU21hCo2aBQOKJw?usp=share_link

13. Outreach activities (Popular lectures)

1. Popular lecture on Spectroscopy—a versatile tool on 03/12/2018 by Dr. R Leena, Assistant professor, Department of Chemistry, Cochin University of Science and Technology
2. Popular lecture on Conservation of water and forests-the need of the hour on 22/03/2019 by Ms. Krishnasree C S, Environmentalist
3. Popular lecture on Probing dimensions beyond common sense on 01/02/2019 by Dr. Reshmi R, Assistant Professor, Department of Physics, Union Christian College, Aluva

Link to access the reports of the events.

<https://drive.google.com/drive/folders/1uVjYFe-zCuwg12uFnXU84brQcL5biCAq?usp=sharing>

15. Invited lectures

1. Mr. Saji, CEO, Pet World, Chalakudy on the topic “Aquarium making for culturing of ornamental fishes”,
2. Mr. Tojo Tharayil Director, DRP Molecules, Kalamassery and Ms. Soja N. J., Research Assistant, DRP Molecules, Kalamassery on the topic “Hands on training on DNA isolation and Bar coding”
3. Ms. Nandini T, Dairy Extension officer Dairy Development Board, Anthikaad, Thrissur on the topic “Animal Husbandry and Dairy development”
4. Ms. Krishnasree C.S., Environmentalist on the topic “Conservation of Water and Forests – the need of the hour” in connection with World Water Day and World Forest Day.
5. Dr. Leena R, Assistant professor, Department of chemistry, CUSAT on the topic “Spectroscopy – a versatile tool”
6. Dr. Rajesh Shenoi, Senior Scientist, Interuniversity Centre for Biomedical Research & Super Speciality Hospital, MG University Campus, Kottayam, Kerala and Dr. Sanal K C, Professor-Investigator, Facultad de Ciencias Químicas Universidad Autónoma de Nuevo León, Mexico on the topic “Recent Trends in Nano Science”
7. Mr. Ramesh, CEO, Nehasil Scientific, Calicut, Kerala on the topic “Glass Blowing Techniques”
8. Mr. Siyad B, Chemical Inspector, Dept. of Factories and Boilers, Kollam, Kerala on the topic “Laboratory safety”
9. Dr. Sreekuttan M Unni, Scientist, Division of electrochemical power sources, CSIR-CECRI, Karaikudi on the topic “Recent trends in Electrochemistry”
10. PProf. Murugan S, HOD (Retired), Department of Chemistry, S. T. Hindu College, Nagerkovil, Tamilnadu on the topic “Semi Micro Analysis”
11. Dr. Roby Cheriyan, Sacred Heart College, Thevara, Ernakulam on the topic “Career Aspects in Physics”
12. Dr. Reshmi R, Union Christian College, Aluva on the topic Seminar on “Probing Dimensions beyond common sense”
13. Dr. Rajeshmon, St. Paul’s College, Kalamassery on the topic “Experimental Physics”

Link to access the reports of the events.

<https://drive.google.com/drive/folders/1uVjYFe-zCuwg12uFnXU84brQcL5biCAq?usp=sharing>