A Proposal for Food Biochemistry Lab

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I. Objectives of the Virtual Lab

To give the students a solid foundation in biology and chemistry and to develop analytical and critical thinking skills in biological phenomena through scientific methods

II. List of experiments

1. Determination of enzyme activity and specific activity (Enzyme assay).
2. Determination of effect of temperature on enzyme activity.
3. Determination of effect of pH on enzyme activity.
4. Determination of effect of substrate concentration on enzyme activity & estimation of Km.
5. Estimation of enzymatic browning in foods.
6. Estimation of enhancement in an enzyme activity during ripening of fruits.
7. Estimation of enhancement in an enzyme activity during sprouting of grains.
8. Detection/ estimation of catalase and peroxidase activity in vegetable.
9. Application of enzymes in various foods.

III. Target group of users

- UG (1st Year/ 2nd Year) [highest priority for development]
- UG (3rd Year/ 4th Year) [next higher priority for development]

IV. Mapping of proposed lab with AICTE courses as per attached list of potential labs

- Food Chemistry and KFT 403

V. Mapping of proposed lab with universities (minimum 3 universities)

- AKTU, Lucknow; KFT453; B. Tech. Food Technology
- HBTU, Kanpur; TFT355; B. Tech. Food Technology
- Tezpur University, Aasam; FE 201; B. Tech. Food Technology
- CFTRI Mysore; FT 006; B. Tech. Food Technology
- NIFTEM, Haryana; BAS121; B. Tech Food Science & Technology
- Sant Longowal Institute of Engineering & Technology, Longowal, Punjab; PCFT-525;
- B.E. Food Engg & Technology
- Guru Nanak Dev University, Amritsar; FST-802; B. Tech: Food Technology
- Islamic University of Science & Technology, Pulwama, Jammu & Kashmir; DFT294E; B. Tech: Food Technology

VI. **Expected timelines**

Presentation of proposal to domain experts' committee – 31st March 2022
Demo of First 3 Expts and Review – 30th June 2022
Demo of 5-6 Expts and review – 31st August 2022
Demo of 7-10 Expts and review – 31st October 2022
Final demo of 7-10 Expts – 15th November 2022
Hosting of lab (7-10 Expts) – 30th November 2022

Note 1: The LDC will coordinate the reviews and hosting

Note 2: The lab is supposed to be developed and hosted within 6 - 9 months from the date of approval

VII. **Budget** (Max. Rs 2 Lakhs per experiment with a ceiling of Rs 20 Lakhs per Lab)

Table I. Budget for <Food BioChemistry Lab>

S. No.	Equipment/Activity	Budget # (In Rupees)
1	Laptop / Machine(computer/laptop)	2.70
2	Manpower(*project engineer/scientist*)	4.80
3	Consumables (various equipment including Autoclave, Oven, PH Meter, Chromatography assembly/ analyzer, Refractometer, Moisture Analyzer, Titration assembly etc)	4.00
4	Contingency (Standardization of DCPIP Dye solution, Orbital Shaker for gentle and intensive mixing of biological and chemical compounds, spectrometric analysis of the given samples etc)	4.00
5	Honorarium for Lab Developer (Rs 20k per experiment; Ceiling of Rs 2 Lakhs per lab)	2.50
6	Miscellaneous	2.00
TOTAL		20 **Lakhs**

To be released based on the recommendation of the review committee
Note: Institute overheads not to be included in the budget

VIII. **Justification of the budget requirements**

(a) Details of Laptop/Machine
A laptop/computer will be required for data-keeping.

(b) Details of Manpower (number, cost per man-months etc.)
i. Total man-months required
1 project staff

ii. No. of project staff, cost per man-months
1 project engineer/scientist (~Rs. 40k per month)

iii. Honoraria for other staff associated with the project
Honoraria for Faculty developing the Virtual Lab: (A maximum of Rs. 2 lakhs honorarium for the developers & Rs. 25k for reviews)
Honoraria for Other staff associated with the project
Rs. 25k honorarium for the associated staff

(c) Details of Consumables
Procurement of various materials including Autoclave is a large pressure cooker, it is a moist sterilization unit, Hot air Oven, PH Meter, Chromatography assembly/ analyzer, Refractometer, Moisture Analyzer, Titration assembly etc

(d) Details of Miscellaneous cost
i. Internal Review (Optional, Rs 1000 per experiment)
ii. Field Trials - N.A.-
iii. Others - N.A.-

IX. **Student Feedback and Learning**

- How will you collect feedback and use them?
  i. We will collect feedback through feedback (online/offline) form and workshops
  ii. There is also an associated email id for providing feedback
  iii. An expansion or additional explanation will be added if the need arises
- What is the actual learning component provided by the Virtual Lab?
  The learning component includes that student will study the analytical procedures for characterizing the properties of foods constituents and their interactions that affect the quality and stability of foods

- After the Virtual Lab experience, would the student be able to perform the experiment in the real lab?
  Yes, after the Virtual Lab experience, the student can perform the experiment in the real lab

ANNEXURE-I

Important information for the development of Virtual Labs

(A Virtual Lab consists of 7-10 experiments)

X. **Link to some sample virtual labs**

https://python-iitk.vlabs.ac.in/ https://cs-iitd.vlabs.ac.in/ https://plchla-coep.vlabs.ac.in/

XI. **Technology Used**

- We will use HTML, CSS and Java Script for front-end design (free and open source)
- For Back-end we will use JSON (Free and open-source Software)

XII. **Required Components for virtual experiments**

- Step by step procedure similar to a physical lab will be drafted for the virtual lab
- Online manual with aim/objective and underlying theory
- Pre-test for understanding current status of user
- Simulator for learning the concept of food technology
- Post-test questions to check the understanding of student after using virtual lab
- Related resources (web & NPTEL lectures)
- Additional help/feedback