



FACULTY OF TECHNOLOGY

ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the B.Tech programme in Industrial Biotechnology degree under R - 2019, Faculty of TECHNOLOGY offered at University Departments was held on 08.01.2019 at 9.30 AM at Conference Hall, A.C.Tech Campus, Anna University, Chennai.

The following members were present:

1.	Dr. N. Selvakumar (Chairperson)	Chairperson & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HoD)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. Meenakshisundaram (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
4.	Dr. S. Renganathan (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
5.	Dr. S. Ramalingam (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
6.	Dr. B. S. Lakshmi (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600025
7.	Dr. J. Tamilselvan	Assistant Professor, Department of Biotechnology, Anna University, Chennai - 600025
8.	Dr. Athi Narayanan N (Alumni UG programme)	Assistant Professor, Department of Bio Technology, IIT Madras, Sardar Patel Road, Adyar, Chennai - 600 025
9.	Dr. Jatin Vimal, (Representative from Industry)	Levim Biotech, 5 th floor, TICEL Biopark R&D, Phase II, Taramani, Chennai, Tamil Nadu - 600 113
10.	Dr. Hari Chirakkal, (Representative from Industry)	VP-R&D, Kemin Industries South Asia Pvt. Ltd., #C-3, 1 st street, Ambattur Industrial Estate, Chennai, Tamil Nadu - 600 058.
11.	Dr. Purna Sai K, Representative from Central/State University)	Principal Scientist, Biological Material Laboratory CSIR-Central Leather Research Institute Adyar, Chennai - 600 020
12.	Dr. S. Narayana Kalkura (Faculty from allied department)	Professor & Director, Crystal Growth Centre, Anna University, Chennai-600 025

13.	Mr. Mukund, (Student representative)	Department of Biotechnology, Anna University, Chennai – 600 025
14.	Ms. Chitra. R (Student representative)	Department of Biotechnology, Anna University, Chennai – 600 025

SPECIAL INVITEES

1. The Director, Centre for Academic Courses, AU, Ch-25
2. The Additional Director / Deputy Director, Centre for Academic Courses, Anna University, Chennai - 25

The Chairperson, Faculty of Technology, Dr. N.Selvakumar, welcomed the members and presented the salient points of Regulations R - 2019 to be followed for the programmes offered at University Departments under CBCS from the academic year 2019 - 2020.

Following self introduction, the students, alumni and the industry experts were asked to give their opinion about the current curriculum.

The Head of the Department, Dr.C.D.Anuradha, made a presentation of the proposed curriculum and syllabi and requested the members to discuss and finalize the curriculum and syllabi for the B.Tech Industrial Biotechnology programme.

After detailed discussion and deliberation, the committee came upon the following observations.

- 1) Industrial experts emphasized that the students required hands-on training individually in the laboratory.
- 2) The industrial experts also suggested that the bridge between industry and academics can be lessened by the department, by connecting with various industries and get their representatives to interact with students.
- 3) They also emphasized on the development of communication skills and logical reasoning
- 4) Summer internship/training in research labs, academic institutes and industries be considered equally while awarding credits.
- 5) Annual plan for academics should be prepared earlier and the individual departments should be given the flexibility to take decision on scheduling exam dates and academic schedule if required.
- 6) Stream electives proposal was dropped after a detailed discussion. Existing elective programmes were maintained. It was also suggested that students can be mentored in their choice of electives, especially if they show an inclination towards a particular stream
- 7) Both theory and lab sessions was proposed for inclusion in the electives.

8) B.Tech (Hons) which includes extra 20 credits (online and professional elective) apart from 165 credits was proposed.

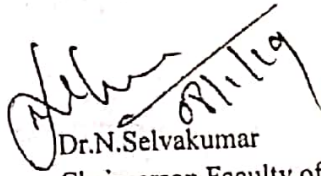
Changes proposed for the curriculum

- i. Semester I- No Changes
 - ii. Semester II- Applied thermodynamics can be changed to Thermodynamics or Thermodynamics for Biotechnologists.
 - iii. Semester III- Stoichiometry title can be changed to Material and Energy Balance. A proposal was put forward to shift communication skills to second semester.
 - iv. Semester IV- No changes
 - v. Semester V- Enzyme technology and Biotransformation can be made as professional elective.
 - vi. Semester VI- No changes
 - vii. Semester VII- No changes
 - viii. Semester VIII- Credits have been reduced to 13, 6 months project duration was accepted, no theory subjects to be offered during this semester.
- 9) If specific subject is required by the students for open elective, it should be discussed with the specific department.
- 10) It was proposed to include tutorials for theory papers.
- 11) It was also decided to leave the second Mandatory course open giving the students the option to choose from the subjects offered.
- 3) Professional electives
- i. Biosafety and bio ethics can be combined, if possible.
 - ii. Fundamentals/ Basics of research methodology can be included.
 - iii. Biophysics and biological spectroscopy can also be combined if feasible.
 - iv. Developmental biology to be added as an elective.

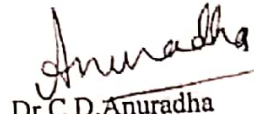
After detailed discussions, the draft version of the Curriculum and Syllabi of B.Tech. Industrial Biotechnology programme was finalized.

The Head of the Department thanked the Chairman, experts and all the members for their inputs and suggestions.

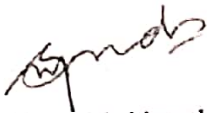
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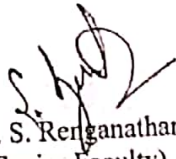
Dr. N. Selvakumar
Chairperson, Faculty of Technology
Anna University, Chennai 25.



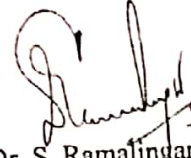
Dr. C. D. Anuradha
HoD, Department of Biotechnology
Anna University, Chennai 25



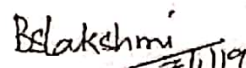
Dr. S. Meenakshisundaram
(Senior Faculty)



Dr. S. Renganathan
(Senior Faculty)



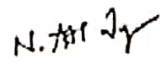
Dr. S. Ramalingam
(Senior Faculty)



Dr. B. S. Lakshmi
(Senior Faculty)



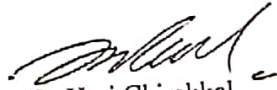
Dr. J. Tamilselvan
(Senior Faculty)



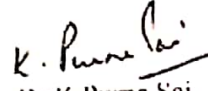
Dr. Athi Narayanan. N
(Alumni UG Programme)



Dr. Jatin Vimal
(Industry representative)



Dr. Hari Chirakkal
(Industry representative)



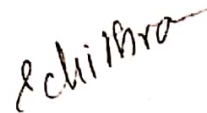
Dr. K. Purma Sai
(Representative from State/ Central institutes)



Dr. S. Narayana Kalkura
(Faculty from allied dept)



Mr. Mukund
(Student representative)



Ms. R. Chitra
(Student representative)



FACULTY OF TECHNOLOGY

ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the B.Tech Programmes in Food Technology, under R - 2019, Faculty of Technology offered at University Departments was held on 09.01.2019 at 9.30 AM at Conference Hall, A.C. Tech Campus, Anna University, Chennai.

The following members were present:

1.	Dr. N. Selvakumar (Chairperson)	Chairman & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HOD)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. Meenakshisundaram (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
4.	Dr. G. Nandhini Devi, (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600025
5.	Dr. S. Ashok Kumar, (Senior Faculty)	Assistant Professor, Department of Biotechnology, Anna University, Chennai - 600 025
6.	Dr. Kalaiselvam S (Faculty Allied Department)	Professor and Head, Department of Applied Science and Technology, Anna University, Chennai - 600 025.
7.	Mr. Sudhakar V (Industrial Person)	Department of Food Technology, Konghu Engineering College, Perundurai, Erode - 638060
8.	Dr. D. Baskaran, (Central/State University)	Dean, Faculty of Food Sciences, College of Food and Dairy Technology, Koduvalli, Chennai - 600 052.
9.	Ms. Niranjanee (Alumni UG Program)	M.Tech Food Technology Department of Biotechnology, Anna University, Chennai 600 025
10.	Mr. Sasikumar D (Student representative)	B.Tech Food Technology Department of Biotechnology, Anna University, Chennai 600 025
11.	Ms. Vasavi (Student representative)	B.Tech Food Technology Department of Biotechnology, Anna University, Chennai 600 025

Dr. Selvakumar, the Convener and Chairman, Faculty of Technology welcomed all the members, explained the agenda for the session and requested all the members to give a brief introduction. The Head, Department of Biotechnology, Dr C.D. Anuradha presented the curriculum and syllabus and requested the members to discuss and finalize the curricula and syllabi of B.Tech Food Technology programme.

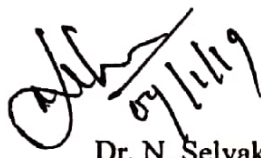
- 1) The meeting started with the Chairman defining the salient points of Regulation R-2019 which is offered at University Departments and to be followed.
- 2) He insisted that the ultimate aim of the course to be generate employment.
- 3) Student representatives were requested to give their inputs and opinions on the curriculum and they emphasized on designing the syllabus according to various competitive exams.
- 4) Industrial experts emphasized on giving the students hands-on training individually in the laboratory, they insisted on providing more laboratory hours.
- 5) The industrial experts also suggested that department can connect with various industries and get their representatives to interact with students for their benefit.
- 6) Panel Emphasized to make a balance between Engineering with Science & Technology. Electives can be given as unit component in core.
- 7) Computer based theory with lab has been moved to I semester. Electrical and Electronic engineering could included in II semester.
- 8) Experts suggested that commodity technology should be included as a core subject.
- 9) The study of Supply chain management should be included as a subject which can include block chain and traceability studies.
- 10) HACCP and TQM should be included in subjects.
- 11) There has to be a bridge between industry and academia, students need an exposure while studying itself.
- 12) Summer internship/training in research labs, academic institutes and industries to be considered equally while awarding credits.
- 13) The new B. Tech Food Technology curriculum has advantage of giving a honors degree when the student earns 21 credits by choosing different electives which maybe on online mode and/or as professional elective apart from 165 credits.

14) Changes proposed for the curriculum

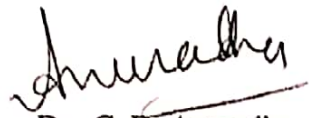
- i. Semester I- subjects interchanged
 - ii. Semester II- subjects interchanged
 - i. Semester III-. Nutrition subject is to be added along with Biochemistry
 - ii. Semester IV- Sensory analysis to be included as one unit in food analysis subject
 - iii. Semester V. Meat, Fish & Poultry theory is renamed as Livestock and Marine Technology and its lab also to be included.
 - iv. Semester VI- No changes
 - v. Semester VII- No changes
 - vi. Semester VIII- 14 credits for project duration of 6 months was accepted. no theory or laboratory to be offered during this semester.
- 15) If specific subject is required by the students for open elective, it should be discussed with the specific department.
- 16) It was proposed to include tutorials for some theory papers.
- 17) Professional electives - to include more subjects such as
- i. Supply chain management
 - ii. Life Cycle Assessment

The credits for PCC, PEC, OE, AC, HSMC, BSC, ESC were framed and balanced according to the Guidelines.

After detailed discussion, the draft version of the curriculum and syllabi of B.Tech Food Technology Programme was finalized.




Dr. N. Selvakumar
Chairperson, Faculty of Technology,
Anna University, Chennai - 25




Dr. C. D. Anuradha
HOD, Department of Biotechnology,
Anna University, Chennai - 600025

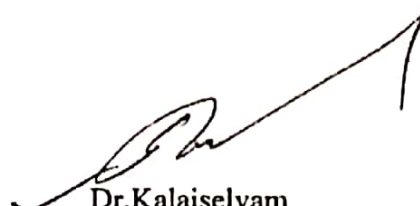
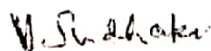


Dr. S. Meenakshisundaram
(Senior Faculty)



Dr. G. Nandhini Devi
(Senior Faculty)

S. AM 
Dr. S. Ashok Kumar
(Senior Faculty)


Dr. Kalaiselvam
(Faculty Allied Department)

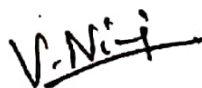
Mr. Sudhakar. V.
(Industrial Person)



Dr. D. Baskaran
(Central/State University)



Mr. Sasikumar D
(Student Representative)



Ms. Niranjane
(Alumni UG Program)



Ms. Vasavi
(Student Representative)



FACULTY OF TECHNOLOGY

ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the B.Tech Programme in Pharmaceutical Technology under R - 2019, Faculty of Technology offered at University Departments was held on 08.01.2019 at 2.00 PM at Conference Hall, A.C. Tech Campus, Anna University, Chennai.

The following members were present:

1.	Dr. N. Selvakumar (Chairperson)	Chairperson & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HOD & Director)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. Meenakshisundaram (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
4.	Dr. S. Renganathan (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
5.	Dr. B. S. Lakshmi (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600025
6.	Dr.S. Moorthy Babu (Faculty Allied Department)	Professor & Director, Centre for Nanoscience and Technology, Anna University, Chennai-600 025.
7.	Dr.C N Ram Chand (Industrial Person)	CEO, Saksin Life Sciences Pvt. Ltd Module No 306, 3rd Floor, Tisel Bio-Park Phase-II, No 5, CSIR Road, Taramani, Chennai, Tamil Nadu 600113
8.	Dr.Hari Chirakkal (Industrial Person)	VP-R&D, Kemin Industries South Asia Pvt.Ltd, #C-3, 1st street, Ambattur Industrial Estate, Chennai, Tamil Nadu -- 600 058.
9.	Dr. K. Ruckmani (Central/State University)	Professor and Head, Department of Pharmaceutical Technology, Director, Centre For Nanobio Translational Research Anna University, BIT Campus, Tiruchirapalli – 620 024
10.	Dr. M.K. Gowthaman (Central/State University)	Sr. Principal Scientist, Head, Biological Material Laboratory, CSIR–Central Leather Research Institute, Adayar, Chennai 600 020
11.	Dr. Stephen Raj (Alumni PG Program)	Professor and Head, Department of Biotechnology Mepco Schlenk Engineering College, Sivakasi -- 626 005
12.	Ms. Devi Subramanian (Student representative)	B.Tech, Pharmaccutical Technology, Department of Biotechnology, Anna University, Chennai 600 025.
13.	Ms. Nimala Devi M (Student representative)	B.Tech, Pharmaceutical Technology, Department of Biotechnology, Anna University, Chennai 600 025

Dr.Selvakumar, the Chairman/Convener, Faculty of Technology welcomed the members and presented the salient points of Regulation R-2019 to be followed for the programmes offered at University Departments under CBCS for the academic year 2019. The members were requested to offer their suggestions to the Head of the Department (HoD).

The HoD made the presentation on the details of the curriculum/syllabi and requested the members to discuss and finalize the curricula/syllabi of B.Tech, Pharmaceutical Technology.

Dr.Ram Chand, one of the industrial experts while sharing his views suggested that many bulk pharmaceutical industries require students with the knowledge of chemical engineering processes whereas the requirement for formulation industries emphasize on practicing knowledge in pharmaceuticals. In the case for the programme in discussion he clearly pointed out that the students who completed this course would be of high demand if they had both fundamental knowledge in chemical engineering sciences and pharmaceutical sciences will enable them to replace the existing chemical engineers currently employed in majority of pharmaceutical bulk industries and will also be able to enrich the traditional pharmaceutical graduates in formulation industries. Hence, suggestions were made to include both relevant chemical engineering and pharmaceuticals for students and persuade them to opt for electives according to their career preference either in bulk drug or formulations industries.

Dr.Ruckmani an academic expert in pharmaceutical sciences pointed out that the Pharmacy Council of India has not recognized the current B.Tech Pharmaceutical technology programme to be an equivalent to the B. Pharmacy course due to the lack of course equivalency and in-depth content in the syllabus of the pharmacy-based subjects that the students learn and suggested that to be an endorsed industrial personnel in the pharma industry whether it is a bulk or formulation they should have an array of fundamental subjects such as in pharmaceuticals, medicinal chemistry and pharmacology. She also suggested revamping the syllabus for course equivalency towards Pharmacy Council should be an added advantage for students to become endorsed production personnel in bulk or formulation pharmaceutical industries.

The following points were discussed and were placed in record to be incorporated in the curriculum and the syllabus that will be designed for the Regulation R-2019.

1. The chairman/convener and industrial experts (Dr.Ram Chand and Dr. Hari Chirakkal) and academic experts (Dr.Ruckmani) in accordance with and inputs from past alumni and current student representatives have strongly suggested the objective of the curriculum should be to train human resources for bulk and formulation industries alike and hence emphasised to include subjects with equal distribution of fundamentals in engineering and pharmaceutical specialties.

2. The discussion centered on preparing sound technical manpower with knowledge on chemical engineering processes relevant for pharmaceutical industries on a wider scale and also to prepare for wider industrial requirements like formulation sciences, regulatory affairs. Experts also suggested including introductory courses on emerging fields as elective subjects in the third or final year of the courses.
3. Further, emphasis on giving hands-on training for students as part of laboratory courses and inclusion of compulsory credits for summer internship/training in research labs, academic institutes and industries as a means to achieve the above goal was also considered for implementation.
4. Annual plan for academics should be prepared earlier and the individual departments should be given freedom to take decision on scheduling exam dates. Stream electives proposal was dropped after a detailed discussion. Existing elective courses were maintained. Both theory and lab sessions was proposed for inclusion in the electives. It was decided that students will be given freedom to opt special electives of other undergraduate programmes such as biotech or food offered in the same department to enrich their knowledge for wider scope of application in industries.
5. B.Tech (Hons) which includes extra 20 credits (online and professional elective) apart from 165 credits was proposed.
6. Changes proposed for the B.Tech (Pharma) under graduate curriculum
 - i. Semester I – It was decided by the committee members to include “Computing Techniques” and “Computing Techniques Laboratory” courses instead of “Engineering Drawing”
 - ii. Semester II – Thermodynamics was changed to “Applied Thermodynamics” and a course on “Basics of Electrical and Electronics Engineering: was included.
 - iii. Semester III – “Stoichiometry” was changed to “Chemical Process Calculations”. A proposal was put forward to shift communication skills to second semester.
 - iv. Semester IV – “Cell and Molecular Biology” theory and laboratory course was introduced to enable them to understand cellular process drug mechanisms in the later semesters. Three of the core papers namely “Technology of Sterile Dosage Forms” (from semester VI), “Technology of Solid Dosage Forms” (from semester V) and “Technology of semi solid and dispersion Dosage Forms (from semester VI)” have been upgraded and clubbed as two core papers namely “Technology of Solid and Semi Solid Dosage Forms” and “Technology of Sterile Dosage Forms and dispersions” and will be offered in 5th and 6th semester respectively.

v. Semester V – “Enzyme technology and Biotransformation” was made as professional elective course, “Pharmaceutical management” course was introduced to make students understand managerial principles of organization in pharmaceutical industries. “Medicinal chemistry laboratory” was introduced as a separate laboratory course.

vi. Semester VI – “Pharmacology laboratory” was introduced as a separate laboratory course. Summer Internship / Summer Project (Minimum 4 Weeks) was made compulsory to enhance industry employability skills.

vii. Semester VII – Core subjects namely “Biopharmaceutics and Pharmacokinetics” and “Regulatory Issues in Pharmaceutical Industry” were retained with emphasis on their role in pharmaceutical industries. “Biopharmaceutics and Pharmacokinetics laboratory” was introduced to supplement the corresponding theory course.

viii. Semester VIII – Credits have been increased to 13, six months project duration was accepted, emphasis was made not to include theory subjects in this semester to facilitate project work.

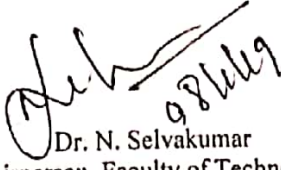
7. It was suggested that while selecting “open electives” if there is a need for specific subject preference then the department was required on behalf of the students to discuss with the specific department that is offering the “open elective” to customize the paper offered.

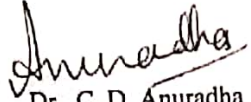
8. It was proposed to include tutorials for theory papers on as-and-when-needed basis.

9. The following Professional electives were modified and/or included based on the suggestions by experts:

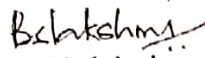
- Equipment and Process Validation in Pharmaceutical Industries
- Nutrigenetics and Neurogenomics
- Toxicology
- Plant equipment design
- Biosafety and Bioethics
- Biophysics and biological spectroscopy.
- Developmental biology.


After detailed discussion, the draft version of the curriculum and syllabi of B.Tech, Pharmaceutical Technology were finalized.

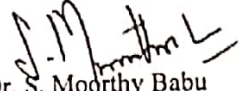

Dr. N. Selvakumar
Chairperson, Faculty of Technology,
Anna University, Chennai - 25


Dr. C. D. Anuradha
HoD, Department of Biotechnology,
Anna University, Chennai - 600025


Dr. S. Meenakshisundaram
(Senior Faculty; Dean, A.C.Tech)



Dr. B.S. Lakshmi
(Senior Faculty)

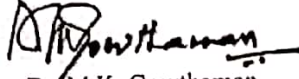

Dr. S. Renganathan
(Senior Faculty)

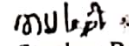

Dr. S. Moorthy Babu
(Faculty Allied Department)



Dr. K. Ruckmani
(Central/State University)

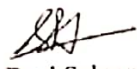

Dr. C N Rani Chand
(Industrial Person)


Dr. Hari Chirakkal
(Industrial Person)


Dr. M.K. Gowthaman
(Central/State University)


Dr. Stephen Raj
(Alumni PG Program)


Ms. Nimala Devi M
(Student Representative)


Ms. Devi Subramanian
(Student Representative)



FACULTY OF TECHNOLOGY
ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the M.Tech Nanoscience and Technology under R - 2019, Faculty of Technology offered at University Departments was held on 10.1.2019 at 2.30 PM at Conference Hall, A.C Tech Campus, Anna University, Chennai.

The following members were present:

1.	Dr. N. Selvakumar (Chairperson)	Chairperson & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HoD)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. MoorthyBabu Head of the Centre	Professor & Director, Centre for Nanoscience and Technology Anna University, Chennai- 600 025.
4.	Dr. T. Devasena (Senior Faculty)	Professor, Centre for Nanoscience and Technology Anna University, Chennai- 600 025
5.	Dr. S. Narayana Kalkura (Senior Faculty)	Professor & Director, Crystal Growth Centre, Anna University, Chennai-600 025.
6.	Ms. K. Tamilarasi (Industrial Person)	Senior Research Associate Resil Chemicals Private Limited Plot No.53-57, KIADB, Bommasandara Industrial Area, Phase – IV, Anekal Taluk, Bangalore – 560099.
7.	Mr.C.K.Ashok kumar (Industrial Person)	Cavinkare international, Cenotaph Road, Chennai – 600 018

8.	Dr. Mahaveer Kumar Jain Central / State University	Professor, Department of Physics Indian Institute of Technology- Madras, Chennai-600 036
9.	Dr.P. Ramamurthy Central / State University	Professor & Head, Department of Inorganic Chemistry, University of Madras, Chennai-600025
10.	Dr. K. Shanthy (Senior Faculty Allied Department)	HOD, Department of Chemistry, Anna University, Chennai-600 025
11.	Ms. M. Neveatha (Student representative)	M.Tech. Nanoscience and Technology, Centre for Nanoscience and Technology, Anna University, Chennai-600025
12.	Ms. A. Saranya (Alumni PG program)	Centre for Nanoscience and Technology, Anna University, Chennai-600025

The Chairperson, Faculty of Technology welcomed the members and presented the salient points of Regulations R - 2019 to be followed for the programmes offered at University Departments under CBCS from the academic year 2019 - 2020.

The members were requested to offer their suggestions to the Head of the Departments (HoD). The Head of the Department made the presentation of details of the Curriculum /Syllabi and requested the members to discuss and finalize the curricula and syllabi of M.Tech Programme.

Specific suggestions for M.Tech Nanoscience and Technology

The students, alumni and industrialists were asked to give their opinion about the course. As an outcome of preliminary group discussion and interaction between students, alumni, industrial, academics- the alumni were of the opinion that the students taking this course come from various backgrounds and hence the curriculum should include subject fundamentals with broad areas covering industrial applications.

The alumni and the student representative suggested hands on training of the instruments available at the centre in order to fetch them more knowledge in characterizing and analyzing the nanomaterials.

- Industrial experts emphasized that the students should take up industrial/societal problems and collaborate with the industries to solve the issues with Nanoscientific concepts for the development of Technology. It was emphasized that this would bridge the academics and industry to empower employment of the students in the same firm.

SEMESTER I

- No changes were suggested for the subject “Mathematical Modelling and Simulation” and “Quantum Mechanics” and the same were retained. The course "Physics and Chemistry of Materials" was removed from first semester course and included for the second semester course as suggested.
- Topics have been revamped between first unit and third unit of the paper "Synthesis and applications of Nanomaterials" and few advanced topics have been included.
- It was suggested to change the name of the course "Nanostructures in Biological systems" and upgrade the syllabus to advanced standards. Accordingly the name was changed to "Biological Nanostructures" and the syllabus was upgraded.
- The laboratory I Computation and Simulation lab was retained with no changes. It was also suggested to change the name of Laboratory II course titled "Synthesis of Nanomaterials" to “Nanomaterial Synthesis lab”.
- It was also suggested to include one paper as a part of Audit course for PG courses. Further, "Research Methodology and IPR was included as RMC course with a suggestion to include the Qualitative and Quantitative Research concepts, Interpretation of Data and Paper Writing.
- New audit courses for the first and second semester are listed as below:

Audit course 1 & 2:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Personality Development through Life Enlightenment Skills.

SEMESTER II

- It was suggested to rename the paper "Physicochemical methods for characterization of Nanomaterials" as "Physicochemical characterization of Nanomaterials".
- Imaging Techniques for NanoTechnology was retained as such with few modifications in the syllabus.
- The following two new laboratory courses with two credentials were introduced to enhance the employability and research skill of PG students regarding instrumentation.
- Lab III Materials Structural characterization lab
- Lab IV Physicochemical characterization lab.
Mini project with seminar was replaced with extra professional elective course.
- The following courses that were offered in the second semester as professional core were removed from the list and are included under professional elective.
- Lithography and Nanofabrication
- Nanotechnology in Health Care
- Photonics for Nanotechnology
- Processing and properties of Nanostructured Materials.
- Following changes were suggested for the courses listed under professional electives


- It was suggested to change the course name from "Lithography and Nanofabrication" as Lithography for Nanofabrication.
- It was suggested to rename the paper "MEMS and Bio-MEMS" as "MEMS and NEMS".
- It was suggested to change the name of the course "Advanced Nanocomposites" as "Nanocomposite Materials". Furthermore, it was suggested to include recent research and topics related to industrial applications.
- It was suggested to change the name of the course "Semiconductor nanostructures and nanoparticles" as "Semiconductor nanostructures". In addition the following course has been listed as new program elective:
 - Nanotechnology in Agriculture and food industry


SEMESTER III

- The third semester subject course MEMS and Bio-MEMS that was offered as Professional core has been removed from Professional core and it is listed under program electives with the name changed as "MEMS and NEMS".
- Project Phase I was retained with 6 credits
- Three program electives and one open elective was introduced.
- The new open elective course was introduced for the third semester and the following courses were suggested as open electives by the committee. In addition, the committee considered all efforts would be made to include the same in the next revision.
 - Bioinformatics
 - Biomimetics
 - Introduction to Cancer biology
 - Ancient medicine in Tamil

SEMESTER IV- Project Phase 2 was retained with a total of 12 credits.

After detailed discussions, the draft version of the Curriculum and Syllabi of M.Tech programmes were finalized.


Chairperson
Faculty of Technology
Anna University,
Chennai-25.

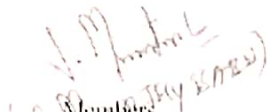

HoD


Members

Members

Members

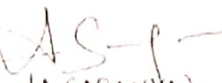
Members

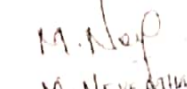

Members


(Dr. S. Narayana Kulkarni)
Members

Members


Dr. K. SIVANEELU
Members


(A. SARANYA)
Members


M. NEETHA
Members



FACULTY OF TECHNOLOGY

ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the *M.Tech Programme in Food technology*, under R - 2019, Faculty of Technology offered at University Departments was held on 09.01.2019 at 2.00 PM at Conference Hall, A.C. Tech Campus, Anna University, Chennai.

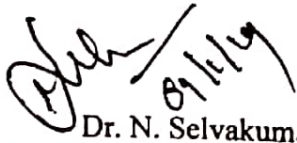
The following members were present:

1.	Dr. N. Selvakumar (Chairperson)	Chairperson & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HOD)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. Meenakshisundaram (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
4.	Dr. G. Nandhini Devi (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600 025.
5.	Dr. V. Sivakumar (Faculty Allied Department)	Associate Professor Department of Chemical Engineering, Anna University, Chennai- 600 025
6.	Mr. P. Muthumaran (Industrial Person)	Director, Food Safety and Standards Authority of India 02nd Floor, Central Documentation Complex (South Wing), Chennai Port Trust, Rajaji Salai, Chennai-600001
7.	Dr. Rekha S Singhal (Central/State University)	Professor, Department of Food Engineering and Technology. Institute of Chemical Technology, Mumbai - 400 019
8.	Mr. Akshay Divakar (Student representative)	M.Tech Food Technology, Department of Biotechnology, Anna University, Chennai 600 025.
9.	Ms. Khushbu.S (Alumni PG Program)	B.Tech, Food Process Engineering, Department of Food Product Development, Indian Institute of Food Processing Technology, Pudukkottai Road, Thanjavur- 613005
10.	Ms. Dhanupriya (Alumni PG Program)	49B, F4, Adhistam flats, Tellus avenue Phase 2, Rajakilpakkam, Chennai - 600 073.

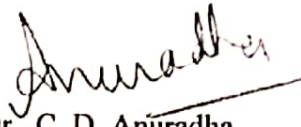
Dr. Selvakumar, the Convener and Chairman, Faculty of Technology welcomed all the members. explained the agenda for the session and requested all the members to introduce themselves. After a brief introduction, The Head of the Department of Biotechnology, Dr C.D.Anuradha presented the curriculum and syllabus and requested the members to discuss and finalize the curricula and syllabi of M.Tech Food Technology programme.

- 1) The meeting started with the Chairman defining the ultimate aim of the course to generate employment among students.
- 2) Student representatives were requested to give their inputs and opinions on the curriculum and they emphasized on designing the syllabus according to various competitive exams.
- 3) Industrial experts emphasized on giving the students hands-on training individually in the laboratory.
- 4) The industrial experts also suggested that department can connect with various industries and get their representatives to interact with students.
- 5) Eligibility for M. Tech Food Technology - Panel decided to include B.E Food process Engineering degree along with other existing bachelor degrees.
- 6) The new M.Tech curriculum was highly appreciated.
- 7) Bridge courses could be included if possible in the curriculum for students from different streams for better understanding.
For students from B.E Mechanical and B.Tech Chemical Engineering/ Technology background – minimum of two courses Food Chemistry and Microbiology and Food processing and Preservation could be offered
For students from B. Tech Biotechnology background - Food Chemistry and Nutrition and Food processing and Preservation subjects could be offered.
- 8) Comprehensive analysis and Recent trends in food science and technology could be included in the syllabus
- 9) Food informatics theory was included as an elective with lab was suggested.
- 10) Safety management systems was suggested to be in the core subjects.

The credits for PCC, PEC, OEC and AC were framed and balanced according to the Guidelines.



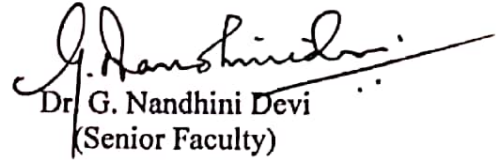
Dr. N. Selvakumar
Chairperson, Faculty of Technology,
Anna University, Chennai - 25



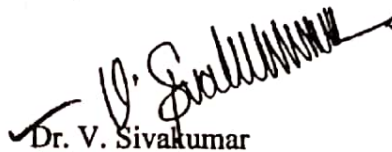
Dr. C. D. Anuradha
HoD, Department of Biotechnology,
Anna University, Chennai - 600025



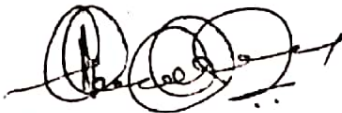
Dr. S. Meehakshisundaram
(Senior Faculty)



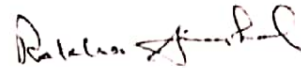
Dr. G. Nandhini Devi
(Senior Faculty)



Dr. V. Sivakumar
(Faculty Allied Department)



Dr. P. Muthumaran
(Industrial Person)



Dr. Rekha S. Singhal
(Central/State University)



Mr. Akshay Divakar
(Senior student representative)



Ms. Khushbu.S
(Alumni PG Program)



Ms. Dhanupriya
(Alumni PG Program)



FACULTY OF TECHNOLOGY

ANNA UNIVERSITY, CHENNAI

Minutes of the Syllabus Sub Committee Meeting

Minutes of the Syllabus Sub Committee meeting of the M.Tech Programmes in Biotechnology, Biopharmaceutical Technology and Computational Biology under R - 2019, Faculty of Technology offered at University Departments was held on 07.01.2019 at 9.30 AM at Conference Hall, A.C. Tech Campus, Anna University, Chennai.

The following members were present :

1.	Dr. N. Selvakumar (Chairperson)	Chairperson & Professor Faculty of Technology, Anna University, Chennai - 600025
2.	Dr. C. D. Anuradha (HoD)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
3.	Dr. S. Meenakshisundaram (Senior Faculty; Dean, A.C.Tech)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
4.	Dr. S. Renganathan (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
5.	Dr. S. Ramalingam (Senior Faculty)	Professor, Department of Biotechnology, Anna University, Chennai - 600025
6.	Dr. V. Adaikkalam, (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600025
7.	Dr. B. S. Lakshmi (Senior Faculty)	Associate Professor, Department of Biotechnology, Anna University, Chennai - 600025
8.	Dr. S. Narayana Kalkura (Faculty Allied Department)	Professor & Director, Crystal Growth Centre, Anna University, Chennai-600 025.
9.	Dr. C. N. Ram Chand (Industrial Person)	CEO, Saksin Life Sciences Pvt. Ltd Module No 306, 3rd Floor, Tidel Bio-Park Phase-II, No 5, CSIR Road, Taramani, Chennai, Tamil Nadu 600113
10.	Dr. Hari Chirakkal (Industrial Person)	VP-R&D, Kemin Industries South Asia Pvt. Ltd, #C-3, 1st street, Ambattur Industrial Estate, Chennai, Tamil Nadu - 600 058.
11.	Dr. M. Micheal Gromiha (Central/State University)	Professor, Department of Biotechnology, Indian Institute of Technology
12.	Dr. Anant Achary (Alumni PG Program)	Kamaraj College of Engineering & Technology S.P.G.Chidambara Nadar - C.Nagammal Campus, S.P.G.C.Nagar, Virudhunagar - 626 001

13.	Mr. Raj Pranab (Alumni PG Program)	103/44, Adam Street, Royapuram, Chennai – 600 013
14.	Ms. Nishanthika T K (Student representative)	M.Tech Biotechnology, Department of Biotechnology, Anna University, Chennai 600 025.
15.	Ms. Swetha R (Student representative)	M.Tech Biopharmaceutical Technology, Department of Biotechnology, Anna University, Chennai 600 025.
16.	Mr. Sambhasan Banerjee (Student representative)	M.Tech Computational Biology, Department of Biotechnology, Anna University, Chennai 600 025

The Chairperson, Faculty of Technology welcomed the members and presented the salient points of Regulation R-2019 to be followed for the programmes offered at University Departments under CBCS for the academic year 2019 – 2020.

The members were requested to offer their suggestion to the Head of the Department (HoD). The HoD made the presentation regarding the details of curriculum/syllabi and requested the members to discuss and finalize the curricula and syllabi of M.Tech Programmes in Biotechnology, Biopharmaceutical Technology and Computational Biology.

Overall suggestions by experts for all PG courses under discussion:

- It was suggested that since students admitted in the PG courses already come with exposure to a minimum of three Mathematics subjects at UG level, it was decided to shift “Applied Statistics for Biologists” which is offered as a Core Course to the list of elective subjects.
- As an outcome of preliminary group discussion and interaction between students, alumni, industrialists, academics – the alumni were of the opinion that the curriculum should include subjects focusing more on fundamentals with their applications and suggested not to narrow-down specialties to increase employability in core industries. The current M.Tech student representatives emphasized on offering more hands-on-training and also suggested for the inclusion of case-study based tutorials.
- Industrialists suggested that if students come from different backgrounds (other than biotech) for inter-disciplinary PG courses like “Computational biology” or “Biopharmaceutical technology”. Students can be given fundamental subjects as bridge courses to enable them to understand the core subjects better.
- Industrial and academic experts emphasized more towards the learning of basics/fundamentals relevant for an industrial subject (eg. buffer making, molar calculations, regulatory aspects) to maximize employment opportunities and said that most of the advanced subjects needed for performing specific industrial tasks will be generally taught on-the-job-training modules.
- It was also suggested to include only relevant subjects in the OEC such as “Cost Management” and also to include “Regulatory affairs in pharma industries”, “Medical transcript writing”, “Patent drafting”.
- Suggestions were made to include all electives to be offered to all PG courses; Core of one program can also be offered as elective in another program.

Specific suggestions for M.Tech. Computation Biology

- The students, alumni and industrialists were asked to give their opinion about the objectives of the programme. Then relevance of programming techniques and importance of C++ was discussed. Experts suggested that instead of C++, Python and its applications in Computational Biology can be included in the I Semester.
- Suggestions were given to revise the title of the Course “Computational Biology” to be changed as “Concepts in Computational Biology”.
- The experts suggested to include an elective-bridge-course titled as “Foundations in Biology” for the students admitted with B.E/B.Tech Computer Science and Engineering background who come without background in biology at UG Level. Since the course attracts students from many core engineering disciplines such as computer science, electrical/electronics, biomedical engineering etc., it was decided to offer this elective-bridge-course however small the number of students’ maybe and to offer the course at least in the form of on-line course with tutorials.
- Since already Python is offered as a course in I semester, experts suggested that Java Language can be given as an elective subject in I semester to benefit some students who already have programming knowledge and are willing to learn more Programming Languages. It was also emphasized to include more lab sessions. Hence, the course was modified to include a total of five labs at various levels of the learning.
- It was suggested to include practical sessions as part of the theory course for “Algorithms in Computational Biology” with corresponding changes in the credits (L T P C – 3 0 2 4)
- It was discussed whether to change the title of the course “Computational System Biology” as “System Biology and Metabolic Engineering”, later it was decided to retain the original title since such similar course are offered in other institutions.
- It was also decided to include “Biomolecular Simulation laboratory” in the second semester and in the third semester to include two laboratory courses titled “System Biology Laboratory” and Big Data Analytics And Next Generation Sequencing Laboratory
- Industrial experts also suggested to include a special elective course titled “Synthetic Biology”

Specific suggestions for M.Tech Biotechnology

SEMESTER I

- The academic and subject experts suggested to emphasize more on contents related with “Fusion molecules Trispecific, Bispecific etc., Small molecules Novel biologics, biospecifics” to be included in the syllabus of the biomaterials elective courses
- “Metabolic engineering” and “Tissue engineering and regenerative medicine” were upgraded as core courses.
- It was also suggested to include “English for Research paper writing” as part of Audit course for PG courses. Further, “Research Methodology” was included as RMC course with a suggestion to include rationale/design of experiments.
- It was suggested to include emphasis on clinical application in the syllabus of “Tissue engineering”.

SEMESTER II :

- It was suggested to include Omic Technologies with a name change as “Applied genomics and proteomics” which also replaced “Advanced genomics and proteomics”.
-

Computational biology was introduced as a core subject to enhance the skill set development of the students.

- Animal Biotechnology was made a core course and was suggested to include contents on development of monoclonal antibodies, transgenic animals, knockouts, regulatory issues, Novel Biologics/ protein engineering
- “Cost management of engineering projects” was introduced as Common Open Elective.
- Mini project with seminar was included as per the revised guidelines.
- “Computational Biology Laboratory” was introduced and was suggested to include drug screening and docking studies and target validation exercise.

SEMESTER III: The following three new laboratory courses are introduced to enhance the employability and research skills of PG students :

- Integrated bioprocess development laboratory
- Sophisticated Analytical Techniques in Biotechnology laboratory
- Metabolic engineering laboratory
- Project Work Phase – I, with minor dissertation was retained.

SEMESTER IV : Project Work Phase – II was retained and was enhanced with a total of 12 credits based on the suggestions that more time is spent in lab work for biotech and pharmaceutical projects.

Specific suggestions for M.Tech (Biopharmaceutical technology)

SEMESTER I

- Contents related with with dosage, stability studies of biopharmaceuticals to be include in the theory “Formulation of biopharmaceuticals”.
- “Molecular pharmacology” was introduced a core subject to enhance the understating of drug mechanisms.
- Research Methodology and English for Research paper writing were included as per AICTE regulations as compulsory subjects
- Laboratory course titled “Formulation and Analytical Techniques in Biopharmaceutical Technology” will be modified to include biochemical and biophysical characterization components for biosimilars.

SEMESTER II

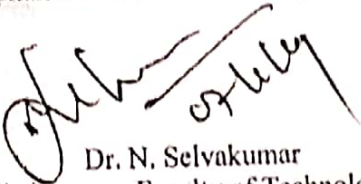
- Previous core subjects were retained, Animal biotechnology was included as core subject,
- “Cost management of engineering projects” was introduced as Common Open Elective.
- Mini project with seminar was included as per the revised guidelines.

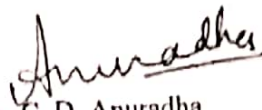
SEMESTER III


- Three new laboratory courses were introduced namely “Bioanalytical laboratory to give emphasis on small/macro molecule discovery (this laboratory course has replaced Drug Discovery Laboratory), Animal biotechnology Laboratory (to include cell line studies, efficacy studies and physical, chemical characterization studies) and Computational methods in pharmaceuticals Laboratory (emphasis on using protein target crystallization, and docking studies)”.
- Project Work Phase – I, suggestions for minor dissertation was retained.


SEMESTER IV : Project Work Phase – II was retained and was enhanced with a total of 12 credits based on the suggestions that more time is needed for research project works in biotech, computational and pharmaceutical projects.


After detailed discussion, the draft version of the curriculum and syllabi of M.Tech Biotechnology, Biopharmaceutical Technology and Computational Biology Programmes were finalized.

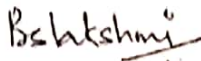

Dr. N. Selvakumar
Chairperson, Faculty of Technology,
Anna University, Chennai - 25

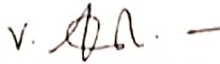

Dr. C. D. Anuradha
HoD, Department of Biotechnology,
Anna University, Chennai - 600025



Dr. S. Meenakshisundaram
(Senior Faculty; Dean, A.C.Tech)


Dr. S. Ramalingam
(Senior Faculty)

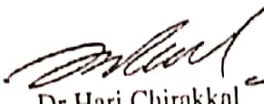

Dr. S. Ranganathan
(Senior Faculty)

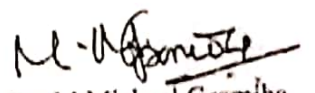

Dr. B.S. Lakshmi
(Senior Faculty)

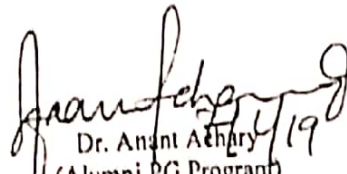

Dr. V. Adaikkalam,
(Senior Faculty)

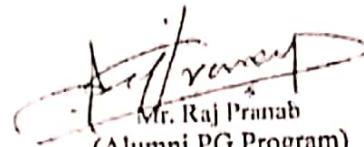

Dr. S. Narayana Kalkura
(Faculty Allied Department)

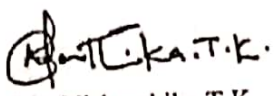

Dr. C. N. Ram Chand
(Industrial Person)



Dr. Hari Chirakkal
(Industrial Person)

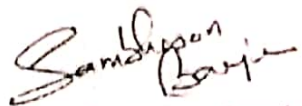

Dr. M. Micheal Gromiha
(Central/State University)


Dr. Anant Achary
(Alumni PG Program)


Mr. Raj Pranab
(Alumni PG Program)


Ms. Nishanthika T K
(Student Representative)


Ms. Swetha R
(Student Representative)


Mr. Sambhasan Banerjee
(Student Representative)