MOFPI
Ministry of Food Processing Industries
Government of India

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

National Institute of Food Technology
Entrepreneurship and Management
(A Deemed to be University-Under De-Novo Category)
MINISTRY OF FOOD PROCESSING INDUSTRIES,
GOVERNMENT OF INDIA

Minutes of 18th Meeting of Academic Council February 07, 2019 at 10:30 A.M. NIFTEM Campus, Kundli

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

Minutes of the 18th meeting of Academic Council of National Institute of Food Technology Entrepreneurship and Management (NIFTEM) held on 07.02.2019 at 10:30 a.m. under the Chairmanship of Dr. Chindi Vasudevappa, Hon'ble Vice-Chancellor, in the Committee Room of NIFTEM Campus, Kundli, Sonepat Haryana.

The following members were present:

1. Dr. R.K. Sharma, Former Director DFRL, Mysore	-	Member
2. D.N. Kulkarni, President, Jain Irrigation Systems Ltd.	-	Member
3. Dr. D.P. Biradar, Vice-Chancellor, UAS Dharwad	-	Member
4. Dr. R.K. Gupta, Director MGIRI Wardha (M.S.)	-	Member
5. Prof. Manjeet Aggarwal, Professor & Dean (R) , NIFTEM	-	Member
6. Prof. M.P. Sahu, Professor & HoD (AES), NIFTEM	-	Member
7. Dr. Vijendra Mishra, Dean (PGS), NIFTEM	-	Member
8. Dr. Kalyan Das, Dean (SW), NIFTEM	-	Member
9. Dr. Ashutosh Upadhyay, HoD FST and Dean (A), NIFTEM	-	Member
10. Dr. Neela Emanuel, HoD (FE), NIFTEM	-	Member
11. Dr. Sanjay Bhayana, HoD (FBM), NIFTEM	-	Member
12. Dr. Vikas Saxena, Associate Professor, NIFTEM	-	Member
13. Dr. P.K. Nema, Associate Professor, NIFTEM	-	Member
14. Dr. Chakkarvarthy Sarvanan, Assistant Professor, NIFTEM	-	Member
15. Dr. Tripti Aggarwal, Assistant Professor, NIFTEM	-	Member
16. Dr. Bhaswati Bhattacharya, Assistant Professor	-	Member
17. Dr. J.S. Rana, Registrar, NIFTEM	-	Secretary

The following members could not attend the meeting, leave of absence was granted by the Chair:

1. Dr. G. Venkateshwarlu, ADG, Education department, Delhi	-	Member
2. Dr. Ravindra Kumar, Quality and Food Safety Lead- AP, DuPont	-	Member

At the outset Dr. J.S. Rana, Registrar NIFTEM and Secretary Academic Council welcomed Hon'ble Chairman and the Members of the Academic Council. Itemized minutes of the meeting were taken up for deliberation after ensuring the quorum.

Agenda Item 18.1

Subject: Confirmation of the Minutes of the last meeting.

The Minutes of the 17th meeting of Academic Council of National Institute of Food Technology Entrepreneurship and Management (NIFTEM), held on 14.11.2018 under the Chairmanship of Vice-Chancellor, NIFTEM were considered by the Council. The Council confirmed and approved the minutes with following changes:

Agenda No. 17.6:
Exclusion of deficiency course from total no. of 04 back papers for provisional promotion:

The Council reviewed the decision and decided that the deficiency course prescribed in first semester of B.Tech has to be cleared by the end of 2nd year. As such for promotion from 2nd year to 3rd year the deficiency course shall be counted for provisional promotion.

Agenda Point no. 17.8.
Assessment of invigilation duties to faculty members:
Apart from Deans and HoDs, Professors may also be excluded from invigilation duties during exams.

Agenda Point No. 17.10:
Introduction of re-evaluation of Answer Books of End Smeester Exam (Theory):
In sub-para 1 the following change may be made:

For: Unevaluated Answers may be evaluated by concerned Internal subject faculty & result revised accordingly.

Read: Unevaluated Answers may be sent back to concerned External Evaluator for evaluation by mail and result compiled accordingly.

Agenda Item 18.2

Subject: Action taken report on the decision of last meeting.

The Council considered the Action Taken Report on the decision of 17th Academic Council meeting held on 14.11.2018 and noted the same with satisfaction.

Agenda Item 18.3

Subject: Holding of 2nd Convocation of NIFTEM on 08th February, 2019 - reg.

Registrar apprised the Council that 2nd convocation is scheduled to be held on 08.02.2019 for conferring degrees to B.Tech (2014-18) and M.Tech & MBA (2016-18) batches, who have pass out in 2018. Apart from these students, 9 students of B.Tech (2012-16 & 2013-17) has also cleared their Degree Programmes through Supplementary Exams. All passout students are required to be conferred Degrees in convocation function by Hon'ble Chancellor, NIFTEM. The Hon'ble Minister of Food Processing Industries has kindly agreed to grace the occasion as Chief Gust & Hon'ble Minister of State of Food Processing Industries & Secretary, MoFPI being Chancellor of NIFTEM Deemed to be University shall also grace the occasion.

The No. of students who are required to be conferred degrees in the convocation function are as under:

B.Tech	2014-18	132
M.Tech	2016-18	81
MBA	2016-18	15
B.Tech Previous Batches		09
	Total	**237**

The Academic Council in its meeting held on 14.11.2018 has already approved the result of 235 students of B.Tech, M.Tech & MBA batches and 7 students of B.Tech (2012-16) and (2013-17) batches pass out

in the year 2018 and authorized the Vice Chancellor NIFTEM to issue the Degree Certificates under his digital signatures. Two more students of 2013-17 B.Tech batch have also cleared their degree programmes through supplementary exam. The Council approved their result and conferment of Degree.The result of 237 students and conferment of respective degrees in Convocation.

The Academic Council approved award of Gold Medals to the top ranking students of B.Tech batch (01 No.) & each stream of M.Tech batch (05 No.) & MBA batch (01 No.) and the academic costumes to degnitories, Members of BoM, AC and FC and students.

Agenda Item 18.4

Subject: Approval of Choice Based Credit System (CBCS) based Course Structure for 2nd Semester of M.Tech (FSQM) through PG (BoS).

The Council considered the recommendations of PG Board of studies of BAS Department made in their meeting held on 05.07.2018 in r/o M.Tech (FSQM) programme. The Council also noted that Vice-Chancellor, NIFTEM and Chairman Academic Council has already approved revised course structure of PG programme of FSQM stream w.e.f. Academic Year 2018-19 subject to ratification by Academic the Council. Based upon the requirements of the AICTE model curriculum and UGC-CBCS guidelines, the course structure of M.Tech (FSQM), second semester, has been revised after a detailed discussion between the External and Internal members of Board of Studies of BAS Department. Since the course structure & syllabus of the course was required to be implemented from the beginning of the Odd Semester 2018-19, the Council ratified the decision taken by Vice-Chancellor, NIFTEM for course structure and contents recommended by PG Boards of Studies as at annexure 18.4

Agenda Item 18.5

Subject: Counting of Foreign Exposure programme as part of Internship of one M.Tech student of FPOM stream.

Dean (Academics) appraised the council that Ms. Krishna Prabha (2nd year M/Tech FPOM) was detailed for Industrial Internship for four month's duration at Tasty Bite Eatables Ltd from 4th September 2018 to 3rd January 2019. However, she could not join the internship on due date due to Foreign Exposure Program organized by NIFTEM during August 2018 followed by VAP conducted by NIFTEM from 20th November 2018 to 2nd December 2018. HR Manager of Tasty Bite Eatables Ltd did not allow the internship for less than four months' duration which was prescribed for the successful completion of internship. As per Company Policy, Taste Bite Eatables Ltd was ready to issue three months' duration internship certificate to the student. However, this will not suffice as the 4th months' internship is required under existing policy. To fulfill the requirement of the academic policy, it is proposed that the one month's Foreign Exposure Program may be considered as part of internship followed by three month's internship at Tasty Bite Eatables Ltd. which will satisfy completion of four months of internship.

It was further stated that the candidate is a topper in M. Tech-FPOM. In order to enable the student to complete the requirement of her degree programme, the Academic Council is requested to accept and approve as a special case, counting of one month Foreign Exposure programme as part of her internship, so that the 'four months' requirement of internship is met.

The Academic Council considered the issue and after detailed discussion approved addition of one month's foreign Exposure programme of the student with industry internship, so that the requirement of 04 months is met.

Agenda Item 18.6

Subject: Examination Question Papers Setting and Answer Sheet Evaluation of MBA.

HoD (FBMED) has appraised the Council that, since inception of MBA programme, paper setting and evaluation was done by the subject faculty teaching the course in line with premium business schools including IIMs. However, In the previous odd semester exams held in December, 2018, paper setting and evaluation by external experts was introduced and the questions paper setting & evaluation of Answer Books was undertaken to external experts. But the external visiting faculty from IIMs, IITs, IIFT, MDI suggested to reinstate to earlier practice, since management education is more of case study application based learning approach. Even, NIFTEM students requested to reinstate to the original practice like IIMs. The concerned faculty, through Board of Studies, is responsible for curriculum design, weightage and assessment criteria for continuous, mid and end term exams like premium institutions. Hence, it is proposed that evaluation of academic course performance in MBA may be based on varying combinations of the following components:

a. Assignments
b. Quizzes
c. Class participation / Attendance
d. Case Study
e. Mid-term Examination
f. Term-end Examination

The Council considered the agenda and was of the view that frequent changes in the pattern should not be made. The Council thus suggested that the existing pattern of external paper setting and evaluation may continue for some time more and the issue be reviewed after a year or so and submitted to Academic Council for consideration.

Agenda Item 18.7

Subject: Agenda points for MBA and M.Tech of FBMED department.

1. Agenda: The criteria/pattern of continuous and mid-term assessment – MBA and M.Tech
   The teacher concerned shall decide the criteria of continuous assessment (20 Marks) and pattern of mid-term exam (20 Marks) for MBA and M.Tech (FPOM).

2. Agenda: Course allocation between External expert and Internal faculty in MBA programme.
   A complete course (subject) should not be allocated to external expert alone, rather in collaboration with of in-house faculty at least 40% of teaching load or more to be decided by in-house teacher concerned through HoD. In the event of non-availability of expertise within the Department, the course allocation shall be shared among two or more external faculty. However, there is no such restriction to in-house faculty for course allocation.
3. Agenda: Consideration of AICTE - CBCS based Curriculum Structure for Ph.D.
   As per the mail received from Dean PG (Annexure – I) & agenda already submitted for AC, the agenda related to PhD Course structure was discussed & approved.

The agenda details are:

The Board of Studies (BoS) gave its consent on the revised structure as per CBCS after due discussions approved it. However, consequent upon notification of PhD regulations (31-07-2018), the Curriculum Development Committee (CDC) again restructured the courses of PhD program at Department of Food Business Management and Entrepreneurship Development and circulated to Administrative Academic Committee (AAC) for its observations and same has been incorporated. Owing to time paucity for meeting call, the email has been sent to all the members of BoS.

The Council considered the agenda and directed that in M.Tech different pattern cannot be followed in FPOM stream. All the five streams should have uniform pattern. However, in MBA, the subject faculty may decide the pattern of continuous assessment & Mid-Term exam. As regards course allocation between external and internal faculty, the HoD may take appropriate decision keeping view the requirement of the programme of the courses.

Supplementary Agenda No. 1

Subject: Regarding change of credit and Code of Methods of Food Analysis.

Dean (Academics) appraised the Council that BAS 312- Methods of Food Analysis with 0-0-04=2 credit course was initially approved by Academic Council in its 6th meeting held on 23.06.2014 for B.Tech programme in 5th semester. Subsequently the D/o BAS submitted that theory inputs are required for the course hence the credit structure may be revised as 2-0-3=4 and offered in 6th semester instead of 5th semester. This was reported to Academic Council in its 14th meeting held on 02.03.2017 but change in course code from BAS 312 to BAS 322 and credit structure from 0-0-4=2 to 2-0-3=4 could not be properly recorded in the Academic Council Minutes consing confusion among students. Accordingly post-facto approval of Academic Council is sought to offer the course in 6th/8th semester with credit structure as under:

- **B.Tech 2014-18 batch-8th semester as BAS 322 with credit 2-0-3=4**
- **B.Tech 2015-19 batch onwards-6th semester as BAS 322 with credit 2-0-3=4**

Supplementary Agenda No. 2

Subject: Approval of final result of Ph.D. students and conferment of Degree - reg.

The Academic Council considered the agenda and noted that the following 04 students have successfully completed the requirements for award of Ph.D. Degree on approved thesis topic and approved conferment of Ph.D. Degree to the concerned students in the 2nd convocation on 08.02.2019, as per details given below.

S.No.	Roll No.	Name
1	713301	Khalid Bashir
2	713401	Tanya Luva Swer
3	713602	Vikas
4	714204	Rachna

The Academic Council also ratified the format of Ph.D. Degree Certificate approved by Vice-Chancellor & Chairman of the Academic Council.

Additional Agenda

Dean (PGS) has submitted that UGC has issued a letter to all Deemed to be universities on 18.01.2019 to reserve seats for Economicallly Weaker Sections (EWS) for admission in all programmes in accordance with MHRD OM dated 17.01.2019 from Academic Year 2019-20. The seat matrix and requirement of additional faculty etc. are being worked out. In the meantime the Academic Council may give its in principle approval to increase seats in B.Tech, M.Tech & MBA from Academic Year 2019-20 in accordance with MHRD directions.

The Academic Council accorded its in principle approval are authorized the Vice-Chancellor to take a final decision. The matter will appraise the Council in its next meeting.

The Meeting ended with a vote of thanks to the Chair.

(Dr. Chindi Vasudevappa)
Vice Chancellor & Chairman AC.

Annexure 18.4

DEPARTMENT OF BASIC AND APPLIED SCIENCES

Course Structure For M. Tech (FSQM); Second Semester

Sem.	Course code	Course type (CC/AECC/SEC / GE/DSE)	Subject Name	L-T-P	Total Credits
2	BAS 521	CC	Food Biotechnology	3-0-2	4
	BAS 522	CC	Food safety and public Health	3-0-0	3
	BAS 525	CC	Biosensors Design and Applications	3-0-0	3
	BAS 523	DSE	Research Methodology	3-0-0	3
	BAS 527	DSE	Advanced Instrumentation for food safety and quality-Part II	2-0-2	3
	FBM 523	GE	Project Finance	3-0-0	4
	FST	GE	Toxicology of Food and Nutraceuticals	3-0-0	3
	BAS 526	AECC	Status Paper and Seminar	0-0-2	1
	BAS 529	AECC	Research Projects	0-0-2	1

Note: The General Electives (GE) courses are offered by Department of Food Technology (FST) and Department of Food Business Management (FBM) and the syllabus of these courses are approved in the PG BOS of respective department.

- **The courses content/syllabus of other department will remain same as approved by the council as submitted through PG BoS of respective department.**

HoD (BAS) also appraised that, the course BAS 525- Biosensors Design and Applications was not offered due to unavoidable circumstances it may be offered in 2nd semester of M.Tech (FSQM) w.e.f. next academemic year i.e. 2019-20. The council has considered the same.

The syllabus for the various core courses (CC) was finalized during the 4th Meeting of BOS held on July 5, 2019and is given as below:

BAS 522	Food Safety and Public Health	Course faculty: Dr.Vijendra Mishra

Unit – 1

Introduction to food safety and standards, food safety strategies.
Food hazards and contaminations.
Case studies related to: biological (bacteria, viruses and parasites), chemical (toxic constituents / hazardous materials) pesticides residues / environmental pollution / chemicals) and physical factors.
Prevention and control of microbiological and chemical hazards.

Unit 2

Nutrition Labelling,
Traceability studies,
Food Recalls,
Residue monitoring plan,
Case studies.

Unit – 3

Risk analysis and its components,
Cost/benefit analyses in risk assessment,
Ethical perspectives, Cultural differences,
Regulatory mechanisms.

Unit – 4

Risk assessment,
Risk ranking, Structured risk assessment,
Risk Management,
Risk perception and acceptability among different stakeholders, Decision making

Unit - 5

Risk communication, Consistency,
Capacity building and information exchange,
Review processes

Rest Lectures to be used for Presentation of library papers by students

BAS 525 – M.Tech CC

Sensor Design and Applications:: (Credits3-0-0)

Theory:

Unit - 1 SENSORS CHARACTERISTICS: Active and Passive sensors – Static characteristic - Accuracy, offset and linearity, dynamic characteristics – Direct and indirect detect detection –SPR- Physical effects involved in signal transduction.

Unit - 2

NANO ELECTRONICS: Grain size effects on properties of materials, carbon nano tubes (SW & MWCNTs), synthesis methods. Carbon electronics, Nano Structures and Nanodevices, photonic band gap tuning.

Unit - 3

MEMS FABRICATION: Thin film fabrication, characterization, microelectronic and mechanical systems (MEMS), microsystems fabrication techniques, packaging of MEMS devices, LIGA (Lithographie-GalvanoformungAbformung).

Unit - 4

SENSOR DEVISES: Types and fabrication of biosensors, industrial applications of Sensors, electronic noses, tongue, SAW-RFID sensors. DNA protein conjugate based sensors, sensors based on molecules.

Unit - 5

SENSORS AND APPLICATIONS:

Applications of nanosciences to nutrients and foods, Food Microstructure, changes during processing, Micro and Nanotechnologies for process control and quality assessment, Biosensors and analysis for functional food safety and analysis, Proteins as transducers and amplifiers, enzyme nanoparticle hybrid sensors, Enzyme activity quenching assays, polyelectrolytic, antibody-antigen interactions, Bio receptors, Ultra-sensitive detection of pathogenic biomarkers.

Suggested Readings:

- W. D. Callister, 2007, *Materials Science and Engineering: An Introduction*, John Wiley & Sons.
- Sulabha K. Kulkarni, 2007. *Nanotechnology: Principles and Practices*, Capital publishing company.
- Mick Wilson, KamaliKannangara, Geoff Smith, 2005, *Nanotechnology: Basic Science and Emerging Technologies*, Overseas press.
- Erika Kress-Rogers and Christopher, J.B. Brimelow, 2008, *Instrumentation and Sensors for Food Industry*, CRC Publications.
- Alexei Nabok, 2005, *Organic and Inorganic Nanostructures,* Artech House Publishers.
- KouroshKalantar-Zadeh, Benjamin Fry, 2008, *Nanotechnology- Enabled Sensors, Springer.*
- Tai Ran-Hsu, 2008, *MEMS and Microsystems, Design, Manufacture and Nanoscale Engineering*, John Wiley & Sons.
- Kenneth J. Klabunde, 2001, *Nanoscale Materials in Chemistry*, John Wiley & Sons
- W.Goddard, 2007 *Handbook of Nano Science, Engineering and Technology*, CRC Press.
- Erika Kress-Rogers and Christopher, J.B. 2001. *Instrumentation and Sensors for Food Industry*, Brimelow, CRC Publications.
- Tai Ran – Hsu, 2008. *MEMS and Microsystems, Design, Manufacture and Nanoscale Engineering*, John Wiley & Sons.

- M.Gentili, C. Giovannella, S.Selci, 1994, *Nanolithography: A Borderland between STM, EB, IB, and X-Ray Lithographies. (NATO ASI Series)*, Kluwer Academic Publishers.
- Raplph et al, 2005, *Nanoscale Technology in Biological Systems*, CRC Press,
- Jerome Schultz, Milan Mrksich, Sangeeta N. Bhatia, David J. Brady, Antonio J. Ricco, David R. Walt, Charles L. Wilkins,2006, *Biosensing: International Research and Development,* Springer,
- George G. (Eds.), 2008, *Organic Semiconductors in Sensor Applications*, Series: A.; Owens, Róisín M.; Malliaras,,Springer's *Series in Materials Science*, Vol. 107.
- Natalie P. Praetories and Tarun K. Mandal, 2007, *Recent Patents on Drug Delivery& Formulation*

BAS 523 - Research Methodology (Credit 3+0+0=3)

Course Objectives:
To expose to various research methods and statistical tools required to analyze the experimental data in food research and industry.

Course Contents: Theory:

Unit No.	Contents
1	Introduction: Nature and objective of research, criteria of good research, scientific approach to research, limitations of applying scientific methods, Ethical issues in research, IPR.
2	Research process, Identification and formulation of a research problem, Steps involved in preparing research proposal. Research Design: exploratory, descriptive, and experimental. Probability and Probability distributions: Different Approaches of probability, addition rule & multiplication rule of probability, conditional probability, Bay's theorem, Binomial, Poisson and Normal distributions.
3	Data and data types, Data collection Methods: Observations, Survey, Interview and Questionnaire. Data Presentation and Analysis: diagrams and graphs, measures of central tendency, dispersion, skewness and kurtosis. Measurement and Scaling Techniques. Inferential Statistics – estimation, type-I and type-II error, testing of hypothesis, test of significance, t-test, Z-test, F-test, Chi-Square test, ANOVA. Design of Experiments: CRD, RBD and LSD.
4	Sampling: Introduction, concept of population, Law of statistical regularity, Law of large numbers, Census Enumeration, Sampling and sampling techniques. Statistical Quality Control: Quality control charts- p-chart, c-chart, X bar charts, R charts, σ charts, process under control and specification limits, process out of control, warning limits, control limits. Benefits & Limitations of Statistical Quality Control. Acceptance Sampling
5	Simple Linear Regression and Correlation: Lines of regression, Karl Pearson's Correlation coefficient, Rank correlation. Report Writing and Presentation: framework of reports, types of reports.

Note: -- Practical aspects of various statistical techniques were discussed with the students.

Suggested Readings:

1. Gupta, C.B.,An Introduction to Statistical Methods, 23rd Edition, Vikash Publications.
2. SC, Gupta & VK, Kapoor., Fundamentals of mathematical Statistics: A modern approach, (2000), Sultan Chand & Sons.
3. Dowdy, S., Wearden, S. and Chilko, D., Statistics for Research, Wiley series (2004).
4. Walpole, R.E., Myers, R.H., Myers, S.l. and Ye, K., Probability and Statistics for Engineers and Scientists, Pearson Education (2002).
5. D. N. Elhance., Fundamentals of Statistics, KitabMahal (1984).
6. C.R., Kothari, Research Methodology, New Age International (2009).
7. Priyaranjan Dash, Research Methodology with SPSS,Vrinda Publications (P) Ltd. (2011)
8. R. Panneerselvam, Research Methodology, PHI (2010).

BAS 521: Food Biotechnology (Credit 3+0+0=3) Semester II

Theory

Unit 1:

Basics principles, methods and Application of Recombinant DNA technology (Restriction enzymes, Vectors: Plasmids, Yeasts and Viral vectors, Basic concepts of Cloning, PCR, Selection and Screening of Recombinants etc).

Unit 2:

Biotechnology and its importance in food safety,Application of genetics to food production,GM foods (Golden Rice, herbicide resistant crops, pesticide resistant crops etc).

Unit 3:

Principles and methods in downstream processing of food products. Bacterial starter culture, Methods of inoculum, and medium preparation, slurry processing and product isolation.

Unit 4:

Technological aspects of industrial production of beer, wine, food enzymes(amylase, pectinase, proteases) organic acids, amino acids, vitamins, antibiotics, baker's yeast, single cell protein. Fermented food: origin, scope and development, sourkraut, yoghurt, cheese, miso, tempeh, idli, dosa, Production of food flavour, food colour.

Unit 5:

Application of biotechnology for disposal of effluents/wastes from food industry, Regulatory and social aspects of biotechnology of foods.

Practicals (8-10 practicals to be taken up)

1. Isolation of genomic DNA from E. coli.
2. Qualitative and quantitative estimation of nucleic acid (Gel electrophoresis/ spectrophotometry)
3. Isolation of plasmid DNA.
4. Restriction digestion of DNA.
5. PCR amplification of DNA.
6. Preparation of competent cells
7. Transformation of DNA in E. coli strain
8. Selection and screening of transformants.

9. Preparation of starter culture
10. Fermentation of alcohol/ yoghurt/ vinegar.
11. Production of amylase/pectinase/proteases/biocolor by fermentation.

Suggested Readings:

1. Perry Johnson-Green. Introduction to Food Biotechnology. CRC Press.
2. Anthony Pometto, KalidasShetty, GopinadhanPaliyath, and Robert E. Levin. Food Biotechnology. Taylor and Francis.
3. Bains W. 1993, Biotechnology from A to Z, Oxford Univ. Press, Oxford.
4. Crueger, W. and Crueger A. 1984. Biotechnology: A Textbook of Industrial
5. Microbiology. Science Tech. Madison, USA.
6. Joshi, V.K. and Pandey, A. Ed. 1999. Biotechnology. Food Fermentation, (2 Vol. set). Education Publ. New Delhi.
7. Knorr, D. 1982. Food Biotechnology. Marcel Dekker, New York.

- Student will have an understanding of recent developments in a specialised area of food science and food microbiology and food biotechnology.
- Student will demonstrate an understanding of the modern biological technologies and the methods involved in generating them. They shall be able to appreciate the relevance of biotechnology, its role and relevance to food science and its contribution to the society.
- Students shall develop an understanding and reasoning on the benefits and challenges in adopting GMO's and modified foods and related regulations by standard regulatory authorities.
- Student will be able to effectively communicate concepts of biotechnology to specialist and non-specialist audiences, using a variety of presentation modes.
- Student will demonstrate knowledge of the regulatory frameworks and ethical principles relevant to food science and biotechnology.