

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIO AND CHEMICAL ENGINEERING

DEPARTMENT OF BIOTECHNOLOGY

Board of Studies (BOS) Meeting

MINUTES OF BOARD OF STUDIES MEETING

Venue: Online Meeting

Date: 26-06-2020 (Friday) Time: 11.00am-12.15pm

BoS Panel of Members present in the meeting

Chair-person : Dr. Wilson Aruni

Attendees : Dr. Chirayu Padhiar, External Member
Senior Medical Director, LifeCell International Pvt., Chennai.

Dr. Parthiban.M., External Member
Professor and Head, Department of Animal Biotechnology,
Madras Veterinary college, Chennai 600007

Dr. Elizabeth Rani, External Member
Head of the Department, Department of Biotechnology,
Hindustan College of Arts and Science, Chennai

Dr. Ramesh kumar V, Internal member

Dr. Valli Nachiyar C, Internal member

Dr. Jayshree Nellore, Internal member

Dr. Karthick Raja Namasivayam, Internal member

The Chair-person welcomed the internal and external board members to the virtual meeting. He invited Dr. Ramesh kumar, Head, Department of Biotechnology to table the agenda. Following this, the agenda points were discussed as follows;

1. Agenda Item 1:

To confirm and approve the use of virtual labs provided by MHRD in B.Tech/M.Tech/B.Sc. curriculum as and when required, especially during COVID times.

Suggestions given by the members The members of BOS appreciated the virtual lab usage during these testing times. However, it was emphasized that hands-on experience would be given to the students at a later stage to impart the practical skill.

2. Agenda Item 2:

To confirm and approve the addition of new open elective courses for B.Tech and M.Tech programme

Suggestions given by the members The members discussed the prominent points associated to National Education Policy 2020 for curriculum development.

- Value based curriculum
- Attention towards AI, IoT, Industry 4.0
- Upgradation of faculty members and students
- Synchronization between academia and industry

Resolutions

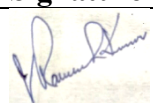
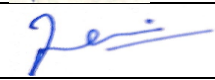

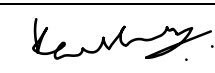
Industry 4.0 (Annexure 1 and Annexure 3) may be introduced and also synthetic biology (Annexure 2) can be included as companies around the world are harnessing the power of nature to solve problems in medicine, manufacturing and agriculture.

3. Any other points with the permission of Chair -Academic flexibilities with extra credits acquired through either advanced study of same courses or with procuring additional credits from additional courses as per student's choice - suggestion. Universal Human values was introduced as a mandate course

Head ask the suggestion to the External members for students undergoing specialization.

Resolutions: The BoS recommended that advanced courses/NPTEL courses can be selected for the specialization. Also recommend that the students can opt these courses at the end of the fourth semester subject to the condition prescribed by the Senate time to time.

The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were incorporated appropriately in the Curriculum and Syllabi. Based on the suggestions given by the members, BoS resolved to recommend the minutes to the Academic Council for further approval.

Internal Member	Designation	Signature
Dr. Ramesh kumar V	Head and Professor	
Dr. Valli Nachiyar C	Professor	
Dr. Jayshree Nellore	Professor	
Dr. Karthick Raja Namasivayam	Professor	


PRO VICE CHANCELLOR/CHAIR



HoD BIOTECHNOLOGY <biotechhod@sathyabama.ac.in>

HoD BIOTECHNOLOGY <biotechhod@sathyabama.ac.in>

Mon, Jun 29, 2021 at 9:05 AM

To: **Parthiban.M** <parthiban.m@tanuvas.ac.in>

Respected Sir,

I am pleased to share the minutes of Board of studies meeting held on 26th June 2020 for your kind approval

Regards

--

**Head,
Department of Biotechnology,
School of Bio and Chemical Engineering
Sathyabama Institute of Science and Technology
(Deemed to be University).
Chennai - 600 119.**

VISION OF THE DEPARTMENT

The department of Biotechnology envisages to empower the students with analytical skills and to create an ethical workforce, competent to transform the future with social consciousness on par with global standards.

MISSION OF THE DEPARTMENT

- M1. To enable the students to acquire technical skills in core aspects of Biotechnologies pertaining to the development of innovative technologies.
- M2. To increase the employability of students by exposing them to various industrial, academic and research environment.
- M3. To inculcate leadership and inter-personal skills by involving students in diversified activities.
- M4. To instil the societal and ethical responsibility in our students.

1 attachments

Minutes of meeting.pdf



172K



HoD BIOTECHNOLOGY <biotechhod@sathyabama.ac.in>

HoD BIOTECHNOLOGY <biotechhod@sathyabama.ac.in>

Mon, Jun 29, 2021 at 9:15 AM

To: **Chirayu Padhiyar** <chirayupadhiar@lifecell.in>

Respected Sir,

I am pleased to share the minutes of Board of studies meeting held on 26th June 2020 for your kind approval

Regards

--

**Head,
Department of Biotechnology,
School of Bio and Chemical Engineering
Sathyabama Institute of Science and Technology
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- M4. To instil the societal and ethical responsibility in our students.

1 attachments

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Chirayu Padhiyar <chirayupadhiar@lifecell.in> Tue, June 30, 2021 at 9:00 AM

To: HoD BIOTECHNOLOGY <biotechhod@sathyabama.ac.in>

Dear Dr.Ramesh

I accept with pleasure the minutes of BoS shared.

Regards,

Dr.Chirayu Padhiar'

Senior Medical Director

LifeCell International Pvt Ltd.,

Chennai, India.

Annexure 1

New Course	INDUSTRY 4.0	L	T	P	C	Max. Marks
		2	0	2	2	100

UNIT 1 ADVANCED TECHNOLOGY AND ADVANCED MATERIALS

7 Hrs.

Advanced electro-optical sensing technology-active, passive multi-spectral and hyper spectral imaging; electronic beam steering; vacuum technology, surface and coating technology, health care technology, Nanotechnology- Nano mechanics, Nano optoelectronics; energy storage technology-next generation Li-based Batteries, Hydrogen storage, solar photovoltaics', Flexible electronics. Intellectual Property Rights - case studies governing/pertaining to Materials/Technology.

UNIT 2 TRANSFORMING TECHNOLOGIES IN BIOENGINEERING

7 Hrs.

Establishment of smart biotechnology factory, Artificial intelligence in Bioprocess technology, Omics – Big data analysis through automation, 3D bio printing for tissue engineering. Simulation tools, RSM and Box model. Cyber physical system based telemedicine, diagnosis and therapeutics through real time biosensors. Bio nanotechnology. Intellectual Property rights (IPR): Case Studies.

UNIT 3 ADVANCEMENTS IN SUSTAINABLE BUILT ENVIRONMENT

7 Hrs.

Introduction – Technological developments in Architectural, Engineering and Construction (AEC) - Building Information Modelling (BIM) using Cloud computing technology and Internet of things (IoT) – Unmanned Aerial Vehicles, sensors – Additive manufacturing in construction – Concrete 3D printing - Materials used - Lightweight and functionally graded structures - Net Zero Energy buildings, Bioswales, Biofiltration pond, Ecosan systems- Recent developments in Waste water Management, Air pollution control, waste disposal - Integration of energy, water and environmental systems for a sustainable development- Emerging Technologies: Robot Highway- Vertical farming - Intellectual Property rights: Case studies

UNIT 4 SMART MANUFACTURING

8 Hrs.

Smart factories and interconnection, Smart Manufacturing – automation systems, Additive Manufacturing, Smart grids, Micro Electro Mechanical Systems (MEMS), Stealth technology, Metal Finishing, Self-propelled vehicles, e mobility, green fuels, drones – unmanned aerial vehicles (UAVs), aerodynamics. Robotic Automation and Collaborative Robots – Augmented reality and haptics, engineering cybernetics and artificial intelligence (AI), Disruptive Technologies – Frugal Innovations – Emerging Technologies - Autonomous Robots, Swam Robot, Modular Robotics, Space craft, Intellectual Property Rights (IPR): Case Studies.

UNIT 5 SMART WORLD

8 Hrs.

Smart Sensors and IIOT, Smart grid, Hybrid renewable energy systems, Electronics in Smart city, Integration of Sensors in Robots and Artificial Intelligence, 5G Technology, Communication protocols, Human-Machine Interaction, Virtual Reality,

Quantum Computing: Changing trends in transistor technology: Processor, Emerging Trends: Deep Space, Swarm Robots, Cyborg, Geofencing, Pervasive Computing, Intellectual Property Rights- Case Studies.

UNIT 6 CYBER PHYSICAL SYSTEMS

8

Hrs.

Introduction to Cyber Physical Systems (CPS), Architecture of CPS, Data science and technology for CPS, Prototypes of CPS, Emerging applications in CPS including social space, crowd sourcing, healthcare and human computer interactions, Industrial Artificial Intelligence, Deep Learning, Gamification, Networking systems for CPS applications, Wearable cyber physical systems and applications, Domain applications of CPS: Agriculture, Infrastructure, Disaster management, Energy, Transportation, Intellectual Property Rights (IPR) : Case Studies.

COURSE OUTCOMES:

- CO1. Apply the basic concepts for electro optical sensing technology and selection of materials.
- CO2. Analyze the technology on AI and Big Data for biomedical applications.
- CO3. Elaborate the various technologies for sustainable built environment.
- CO4. Evaluate different smart manufacturing technologies for industrial robotics-based automation.
- CO5. Compare various advanced technologies for development of smart city.
- CO6. Build Cyber physical systems using AI for Industry, Agriculture and disaster management applications.

Max. 45 Hrs.

TEXT / REFERENCE BOOKS

1. William D. Callister, Materials Science and Engineering: An Introduction, John Willey and Sons Inc. Singapore, 2001.
2. Raghavan V., Physical Metallurgy: Principle and Practice, Prentice Hall India Pvt. Ltd., 2006.
3. Flavio Craveiro, Jose Pinto Duarte, Helena Bartolo and Paulo Jorge Bartolo, "Additive manufacturing as an enabling technology for digital construction: A perspective on Construction 4.0", Automation in Construction, Vol. 103, 2019.
3. Klaus Schwab, Fourth Industrial Revolution, Random House USA Inc., New York, USA, 2017.
4. Oliver Grunow, "SMART FACTORY AND INDUSTRY 4.0. The current state of Application Technologies", Studylab Publications, 2016.
5. Alasdair Gilchrist, "INDUSTRY 4.0: Industrial Internet of Things", Apress, 2016.
6. Sang C.Suh, U.John Tanik, John N Carbone, Abdullah Eroglu, "Applied Cyber-Physical Systems", Springer Publications, New York, 2013

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100
Hrs.

Exam Duration: 3

PART A: 11 Questions of 2 marks each-No choice

22 Marks

PART B: 2 Questions from each unit with internal choice, each carrying 13 marks

78

Mark

New Course Synthetic biology

Course objectives

The course familiarizes students to the rapidly developing field of synthetic biology. The components of synthetic biology are introduced and its commercial applications are elaborated.

Unit I : Introduction to Synthetic biology

Introduction to synthetic biology. Background of Gene Regulatory Mechanisms (Gene Parts- Gene Structure, Promoters, Terminators, Enhancers, Inducers, Repressors, Transcription Factors, Co-factors, transcriptional and post-transcriptional regulation, post-translational modifications). Genetic Engineering and Genome Editing

Unit II : Elements of synthetic biology - Tools

Gene shuffling for large scale pathway assembly and engineering; Choices for microbial hosts for industrial applications– bacteria, yeast, insect. Gene editing methods – CRISPR/ Cas; Gene sequencing – Pyrosequencing, Nanopore sequencing.

Unit III : Bacterial circuits and Biobricks

Bacterial circuits: feedback, feed-forward, toggle switch, signal propagators and band filter, synchronized oscillators. Introduction to Bio Bricks & its applications. Microarrays & systems biology - a basic introduction

Unit IV : Mathematical modeling, simulation & applications

Noise in Gene Expression. Mathematical Modeling and Simulation. Biosensors. Application of software tools for modelling gene expression. Commercial Applications - Biomedicine, Biomaterials, Biofuels and Bioremediation; Global events & competitions- iGEM, synbiobeta.

Unit V : Regulations & ethics

Safety & bioethics, legal & IP elements involved in synthetic biology applications for human, animals and plants.

Course outcome

On completion of the course, the student will be able to;

CO1 : Define synthetic biology and outline its components.

CO2 : Paraphrase the biological mechanisms as circuits.

CO3 : Articulate on the elements of synthetic biology

CO4 : Illustrate bacterial circuits and biobricks

CO5 : Appraise on the applications, regulations and ethics of synthetic biology

CO6 : Design biobricks and novel metabolic pathways.

Text Books/References:

1. Eric Davidson, The Regulatory Genome: Gene Regulatory Networks In Development And Evolution, Academic Press (2006).
2. Hamid Bolouri, Computational Modeling of Gene Regulatory Networks - A Primer, Imperial College Press (1st edition) (2008).
3. Freemont, P.S and Kitney, R.I. (2012). Synthetic Biology – a Primer. World Scientific Publishing Co pte Ltd
4. Singh, V and P.K. Dhar. (2015). Systems and Synthetic Biology. Springer publishing, Netherlands
5. Fu, P and Panke, S (2009). Systems Biology and Synthetic Biology. Wiley Publishing.

6. Covert, M.W. (2014). Fundamentals of Systems Biology: from Synthetic Circuits to Whole Cell Models. CRC Press
7. Konopka, A. K. (2006). Systems Biology: Principles, Methods, and Concepts. CRC Press.
8. Church, G and Regis, E. (2012). Regeneration: How Synthetic Biology will Reinvent Nature and Ourselves. Basic Books.
9. Standards for Plant Synthetic Biology - <http://onlinelibrary.wiley.com/doi/10.1111/nph.13532/full>
10. Synthetic and Systems Biology for Microbial production of Commodity Chemicals –
11. <http://www.nature.com/articles/npjsba20169>.
12. Biotechnology and Synthetic Biology Approaches for Metabolic Engineering of Bioenergy Crops - <https://www.ncbi.nlm.nih.gov/pubmed/27030440>.
13. Microarray Data Analysis: Gene Expression Data Analysis. A Beginner's Guide by: Helen Causton (Imperial College), J Quackenbush and Alvis Brazma (The European Bioinformatics Institute).
14. A Practical Approach to Microarray Data Analysis (Hardcover) by Daniel P. Berrar (Editor), Werner Dubitzky (Editor), Martin Granzow (Editor).

Annexure 3

New Course	INDUSTRY 4.0	L	T	P	C	Max. Marks
		2	0	2	2	100

UNIT 1 TRANSFORMING TECHNOLOGIES IN BIOENGINEERING 7 Hrs.

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UNIT 2 ADVANCEMENTS IN SUSTAINABLE BUILT ENVIRONMENT 7 Hrs.

Introduction – Technological developments in Architectural, Engineering and Construction (AEC) - Building Information Modelling (BIM) using Cloud computing technology and Internet of things (IoT) – Unmanned Aerial Vehicles, sensors – Additive manufacturing in construction – Concrete 3D printing - Materials used - Lightweight and functionally graded structures - Net Zero Energy buildings, Bioswales, Biofiltration pond, Ecosan systems- Recent developments in Waste water Management, Air pollution control, waste disposal - Integration of energy, water and environmental systems for a sustainable development- Emerging Technologies: Robot Highway- Vertical farming - Intellectual Property rights: Case studies

UNIT 3 SMART MANUFACTURING 8 Hrs.

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UNIT 4 SMART WORLD 8 Hrs.

Smart Sensors and IIOT, Smart grid, Hybrid renewable energy systems, Electronics in Smart city, Integration of Sensors in Robots and Artificial Intelligence, 5G Technology, Communication protocols, Human-Machine Interaction, Virtual Reality, Quantum Computing: Changing trends in transistor technology: Processor, Emerging Trends: Deep Space, Swarm Robots, Cyborg, Geofencing, Pervasive Computing, Intellectual Property Rights- Case Studies.

UNIT 5 CYBER PHYSICAL SYSTEMS

8Hrs.

Introduction to Cyber Physical Systems (CPS), Architecture of CPS, Data science and technology for CPS, Prototypes of CPS, Emerging applications in CPS including social space, crowd sourcing, healthcare and human computer interactions, Industrial Artificial Intelligence, Deep Learning, Gamification, Networking systems for CPS applications, Wearable cyber physical systems and applications, Domain applications of CPS: Agriculture, Infrastructure, Disaster management, Energy, Transportation, Intellectual Property Rights (IPR) : Case Studies.

Max. 45 Hrs

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4. Klaus Schwab, "Fourth Industrial Revolution", Random House USA Inc, New York, USA, 2017.
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SCHOOL OF BIO AND CHEMICAL ENGINEERING

DEPARTMENT OF BIOTECHNOLOGY

Board of Studies Minutes of Meeting

Date : 06-01-2021 (Wednesday)

10.00am-11.45pm

Chair-person : Dr. Wilson Aruni

Attendees : Dr. Chirayu Padhiar, External Member

Senior Medical Director, LifeCell International Pvt., Chennai.

Dr. Parthiban.M., External Member

Professor and Head, Department of Animal Biotechnology,

Madras Veterinary college, Chennai 600007

Dr. Ramesh kumar V, Internal member

Dr. Valli Nachiyar C, Internal member

Dr. Jayshree Nellore, Internal member

Dr. Karthick Raja Namasivayam, Internal member

The Chair-person welcomed the internal and external board members to the virtual meeting. He invited Dr.Ramesh kumar, Head, Department of Biotechnology to table the agenda. Following this, the agenda points were discussed as follows;

The minutes of the Board of Studies meeting held on, 2020 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the 16th Academic council.

1. Agenda item # 1 Implementation of Industry 4.0 and systems biology

The proposed new courses in the last BoS meeting, Industry 4.0 (SAIC4001), Industry 4.0 (SCCA9501) and systems biology (SBTA4002) is plan to implement in the 3rd , 2nd and 6th Semester for batch (Jan 2021 – May 2021)

Resolutions: The members approved the recommendations

2. Agenda item # 2 Addition of new open elective Courses for M.Tech/B.Tech Programme

The Head of the department highlighted the feedback from the Alumni for the incorporation of elective courses focus on Ecology and Evolution, Phylogenetics and bioentrepreneurship.

Resolutions:

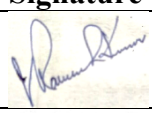

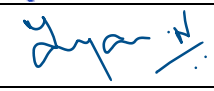

The BOS recommend for inclusion of the bioentrepreneurship course in B.Tech /M.Tech Programme of Biotechnology

Agenda item # 3 Implementation of skill development programme to provide hands-on-training in tools and techniques in Biotechnology and allied areas to generate skilled manpower.

Head pointed the skill development course conducted in association with Research Centres, Sathyabama Institute of Science and Technology

Resolutions: The BoS recommended the initiation taken by the department.

Dr. Ramesh, Professor thanked all the members for their kind cooperation and the meeting came to an end.

Internal Member	Designation	Signature
Dr. Ramesh kumar V	Head and Professor	
Dr. Valli Nachiyar C	Professor	
Dr. Jayshree Nellore	Professor	
Dr. Karthick Raja Namasivayam	Professor	


PRO VICE CHANCELLOR/CHAIR

