

**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 the pandemic COVID19. 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 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 (B.Tech. and M.Tech.)
- 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 industries worldwide are harnessing the power of nature to solve problems in medicine, manufacturing and agriculture.

## **3. Agenda Item 3:**

The syllabus for the course SBT5605 Analytical Biotechnology was revised to SBTA7006 Advanced Bioinstrumentation and the same was tabled before the board for approval.

**Resolutions:** The BoS ratified the proposal to revise the course syllabus and approved the same.





## **4. Agenda Item 4:**

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

Head asked the suggestion of the External members for students undergoing specialization.

**Resolutions:** The BoS recommended that advanced/NPTEL courses can be selected for the specialization and was recommended that the students can opt for 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.

<b>Internal Member</b>	<b>Designation</b>	<b>Signature</b>
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

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HoD BIOTECHNOLOGY <[biotechhod@sathyabama.ac.in](mailto:biotechhod@sathyabama.ac.in)>

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HoD BIOTECHNOLOGY <[biotechhod@sathyabama.ac.in](mailto:biotechhod@sathyabama.ac.in)>

Mon, Jun 29, 2021 at 9:05 AM

To: **Parthiban.M** <[parthiban.m@tanuvas.ac.in](mailto:parthiban.m@tanuvas.ac.in)>

Respected Sir,

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

Regards

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**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.

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#### **1 attachments**

**Minutes of meeting.pdf**



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HoD BIOTECHNOLOGY <[biotechhod@sathyabama.ac.in](mailto:biotechhod@sathyabama.ac.in)>

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HoD BIOTECHNOLOGY <[biotechhod@sathyabama.ac.in](mailto:biotechhod@sathyabama.ac.in)>

Mon, Jun 29, 2021 at 9:15 AM

To: **Chirayu Padhiyar** <[chirayupadhiar@lifecell.in](mailto:chirayupadhiar@lifecell.in)>

Respected Sir,

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

Regards

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

To: HoD BIOTECHNOLOGY <[biotechhod@sathyabama.ac.in](mailto: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**

<b>New Course</b>	<b>INDUSTRY 4.0</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Max. Marks</b>
		<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>100</b>

**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). Regenesi: 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*

<b>New Course</b>	<b>INDUSTRY 4.0</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Max. Marks</b>
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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.**

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**Max. 45 Hrs**

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