Dow University of Health Sciences

Prospectus

BS Biotechnology

Session 2023-24

Dow College of Biotechnology (DCoB)

email: admissions@duhs.edu.pk
website: www.duhs.edu.pk

MESSAGE BY VICE CHANCELLOR

Prof. Mohammed Saeed Quraishy
Vice Chancellor
Dow University of Health Sciences

It gives me joy to write this message for the prospectus of the Dow University of Health Sciences, Karachi. DUHS was established in 2004, with just three constituent colleges, and today we are a university with over 30 constituent and affiliated institutions and the most comprehensive health system in Pakistan.

This year, I am also proud to announce that Dow University of Health Sciences, Karachi has continued to enhance the vision of this University by striving to be the pre-eminent academic institution committed to changing and saving lives, as we have continued to place in the QS World University Rankings 2021, with an overall Rank of 401-450. This is a credit to the faculty of DUHS, and their commitment to enhance the learning experience offered to our students that we have achieved progress and prosperity globally, particularly within Asia.

This is also the year we are celebrating our 75th Anniversary of the founding of Dow Medical College, a symbol of scholarship and service to the community that has evolved into DUHS, with expanded program offerings, such as in the fields of the allied health and biomedical sciences, such as pharmacy, physical therapy, medical technology, biotechnology, nursing, public health, business administration, and course in radiology technology, nutritional sciences, midwifery, and optometry.

Furthermore, our symbol of academic excellence is fortified by our adoption of the latest technology, and affordable state of the art healthcare offered, which informs the delivery of quality patient care at Dow University Hospital and our many affiliated healthcare centers and research and diagnostic laboratories. We stand committed to providing and creating a state-of-the-art infrastructure that fosters innovation, research and is evolving to meet the needs of the future, along with providing superior healthcare services today.

Today, we are striving to play a pivotal role in the early diagnosis and treatment of Covid-19 and in the future, I also stand committed to make Dow University of Health Sciences an empowered institution offering the best of the medical knowledge and quality health services.

I am confident that the doctors and health professionals of this institution will go on to contribute to this nation and serve globally with sincerity and ethics, in order to restore faith and humanity to the delivery of healthcare.

Good Luck to the incoming freshmen!

Prof. Dr. Mushtaq Hussain
Principal
Ph.D. (Genetics, Genomics and Systems Medicines)
University of Glasgow, UK

MESSAGE BY PRINCIPAL

It gives me an immense pleasure to welcome the new batch of Dow College of Biotechnology. The world of science is fast moving and progressing at a teeming pace. Resultantly, many new branches of science have been developed to entertain the need of time and to address emerging problems of modern-day world. Biotechnology is by all means one such branch of science, amalgamating classical and modern disciplines of both natural and physical sciences with particular focus on seeking and developing practical applications of theoretical knowledge. Dow College of Biotechnology, an institute of prestigious Dow University of Health Sciences, holds the same core theme in its foundation and the college is well regarded for imparting both academic and practical skills amongst the students.

Dow College of Biotechnology has progressed exceptionally well and is now known for its academics and research throughout the country. In recent times, research conducted at Dow College of Biotechnology during the COVID-19 pandemic has been praised both nationally and internationally and leads to some of the best research publications from Pakistan on SARS-CoV-2 with considerable theoretical and practical insights.

The college holds a large sum of Ph.D. faculty which are actively engaged in research alongside the teaching activities. To ensure translation of theoretical knowledge into practical application, students are encouraged to get engaged with small to advance level research projects with faculty as they move along during four years of their studies. This approach makes Dow College of Biotechnology unique amongst its contemporaries. Students at Dow College of Biotechnology have presented their research at multiple national and international scientific forums.

Dow College of Biotechnology maintains strong linkage with the industries to keep students aware of their recent development and demands. The college has recently developed linkage and student exchange programs with some of the prestigious International Universities. With a team of highly competent faculty and supporting staff, I am confident that we will extend our utmost support to the students to excel in their respective carriers.

I wish all the best to the prospective students at Dow College of Biotechnology, God Speed.

VISION STATEMENT DUHS

To Be a Pre-Eminent Academic Institution Committed to Changing and Saving Lives

MISSION STATEMENT

Providing Outstanding Patient Centered Education, Training and Clinical Care Informed by Cutting Edge Research and Innovation Generating and Disseminating New Knowledge

INTRODUCTION OF DOW COLLEGE OF BIOTECHNOLOGY

DOW COLLEGE OF BIOTECHNOLOGY

Dow College of Biotechnology (DCoB) is a constituent College of Dow University of Health Sciences. The college is in the graceful building of Dow Research and Diagnostics Complex. Currently, a four-year BS Biotechnology program is conducted at DCoB. The College has excellent teaching faculty comprised of foreign qualified Ph.D. scientists who are extensively involved in research activities and hence are well aware of the recent developments in the field of science. Teaching methodology at DCoB is a well-planned blend of theory and practical skills. To facilitate this, state of the art research and academic laboratories are the integral component of the college premises. Additionally, the centrally air-conditioned college has large size lecture halls, seminar room, and students' discussion rooms. For students who have a passion for becoming scientists and professionals of their respective fields, Dow College of Biotechnology provides an excellent platform. The BS-Biotechnology curriculum has been meticulously designed to produce competent human resource in the field of biotechnology, and to train the graduates to apply the gained scientific knowledge to address locally prevalent health, environmental, food and industrial issues.

Scope of Biotechnology in Pakistan

Biotechnology is one of the most growing and exciting fields of science in the world. Biotechnology is the application of any biological system (living organisms or their derivatives) to address any problem related to human life. It is a multidisciplinary science which utilizes knowledge generated in the field of genetic engineering, cell and tissue culture, stem cell, molecular biology, microbiology, biochemistry, vaccinology, virology, and bioinformatics to address existing issues. Biotechnology students are trained for innovation, creative thinking, entrepreneurship, and multidisciplinary approach to develop products for the benefit of human life. There are different branches of biotechnology which includes food biotechnology, health and medical biotechnology, microbial biotechnology, agricultural biotechnology, environmental biotechnology, pharmaceutical biotechnology, industrial biotechnology, marine biotechnology, and animal biotechnology etc.

Following are some of the applications of biotechnology:

- To produce r-DNA products, monoclonal antibodies, vaccines, diagnostics, anticancer drugs, insulin, skin grafting and development of tissue specific delivery methods.
- To produce safe, efficient, and cost-effective industrial chemicals and enzymes for textile, paper, sugar and food industries, biodegradable plastics etc.
- To produce a wide range of GM crops, bio-fertilizers, bio-pesticides.
- To improve environmental conditions through soil and water remediation, oil spillage, water, and sewerage treatment.
- To produce fermentation-based products, cheese, yeast, wine, beer, yogurt, food additives etc.

Objectives of the Program

- To develop strong theoretical and practical foundations amongst graduates in different disciplines of science that coalesce in biotechnology.
- To provide challenges that instigate students to transform their theoretical knowledge into practical solutions.
- To enhance critical thinking and interrogative analytical skills amongst the graduates.

Eligibility Criteria of the Candidate

- HSSC Pre-Medical / Pre-Engineering or equivalent examination (e.g. A-Level, 12th grade etc) duly certified by IBCC with minimum 60% marks.
- Candidate's PRC & Domicile of Sindh

Seat Distribution for BS-Biotechnology Course at Dow College of Biotechnology

Dow College of Biotechnology offers a total of 100 seats, which are filled totally on merit basis.

Fee Structure of BS Bio-Technology

SESSION 2023-24

Amount in PKR.

FEE TYPE	BS BIO TECH.
Admission Fee (Once only)	45,000
Tuition Fee (Yearly)	156,873
Document Verification Charges (Once only)	2,500
Student Activity Fee (Yearly)	10,000
Library Charges (Yearly)	10,000
Total	**224,373**

- Transport Fee (Optional) Rs. 36,000/- per year.

RULES FOR THE PAYMENT OF FEE

Fee for 2nd, 3rd & 4th year tuition fee (of the respective categories) will have to be paid within the specified time.

Late fee for succeeding years will be charged if fee is not paid within the provided deadline as per rates below:

- First month (after lapse of first month % 2.5.....of tuition fee
- Second month % 5.0.....of tuition fee
- Third month %7.5.....of tuition fee
- Fourth month%10 .....of tuition fee

Fee of all categories will be increased by 10% every year.

AFTER FOUR MONTHS OF NON-PAYMENT, THE SEAT IS LIABLE TO BE CANCELLED AND STUDENT WILL NOT BE ALLOWED TO APPEAR IN ANY EXAMINATION.

- Fee deposited is refundable as per the Refund policy guidelines of the DUHS.
- Taxes will be applied as per the FBR rules.
- Hostel and Transport fee will be valid till December, 2024.
- Amounts stated in the fee vouchers are excluded of all Bank Charges.
- The Fee Structure may be revised by the university at any time during the course of the study, due to unavoidable circumstances

Career Prospects/ Opportunities

Biotechnology is an interdisciplinary science which provides a fascinating platform to grow and experience the diverse fields of science and technology. It is revolutionizing new prospects and developments to improve the quality of human life. Due to strong academic and practical training provided to biotechnology graduates, they are among the top choice of academic, research and industrial employers. Demand of biotechnology products is rising in Pakistan therefore, there is a huge scope for biotechnology students in terms of jobs and entrepreneurship. After completing their graduation, biotechnologists will be able to choose their career in research and development sectors of various industries including textile, food, biofuel production, cosmetics, etc. They can also find their career in diagnostic laboratories and pharmaceutical industries. Horticulture industry and agriculture biotechnology laboratories and research centers are also a captivating target for newly graduated biotechnologists. Biotechnology also offers a wide range of career opportunities related to academics and research in various Institutes and Universities. It also provides innovative and exciting job opportunities in scientific and administrative sectors.

Recognition by Governing Bodies/Councils

The BS-Biotechnology program is approved by syndicate of Dow University of Health Sciences and the curriculum is approved by the Higher Education Commission, Pakistan. The curriculum has been designed following centralized BS-Biotechnology curriculum of HEC with availability of series of quality-based laboratories are one of the chief factors in deciding the success of the program. The laboratories available at the DUHS are state-of-the-art and sufficiently equipped to facilitate the learning objectives of this curriculum.

Curriculum

BS Biotechnology at DUHS is a Four-year degree program comprising of eight semesters in total. The course lay out is prescribed by the Higher Education Commission (HEC) of Pakistan, which consists of 46 courses of 130 credit hours. In this program, great emphasis is placed upon integrating theory with practice as the curriculum is divided into both theoretical and laboratory-based learning. It is to enable students to attain the required level of expertise, before further practically testing out classroom knowledge through experiments.

STRUCTURE

Categories	No. of Courses	Credit hours
General Education Courses	12	34
Disciplinary/ Major	28	78
Interdisciplinary/ Distribution Courses	4	12
Capstone Research Project	2	6
Total	46	130

- **Total number of credit hours:** 130
- **Duration:** 4 years
- **Number of semesters:** 8
- **Semester duration:** 16-18 weeks
- **Number of courses per semester:** 5-6

BS-BIOTECHNOLOGY (4 YEAR) CURRICULUM DESIGN

General Education Courses 12 Courses 34 Credit Hours			
Subject	**Cr. hr**	**Subject**	**Cr. hr**
1. English I	3+0	7. Physical & Inorganic Chemistry	2+1
2. English II	3+0	8. Organic Chemistry	2+1
3. Biomathematics	3+0	9. Introduction to Computer Science	2+1
4. Pakistan Studies	3+0	10. History and Creative Arts	3+0
5. Islamic Studies/Ethics	2+0	11. Probability, Biostatistics & Logical Analysis	3+0
6. Biosafety & Bioethics	2+0	12. Economics	3+0

Disciplinary/ Major		Interdisciplinary/ Distribution Courses		Capstone Research Project	
28 Courses		4 Courses		2 Courses	
78 Credit Hours		12 Credit Hours		6 Credit Hours	
Subject	**Cr. hr**	**Subject**	**Cr. hr**	**Subject**	**Cr. hr**
1. Microbiology	2+1	1. Pharmaceutical Biotechnology	3+0	1. Research Thesis / Media in Science	3+0
2. Biochemistry-I	2+1	2. Cell and Tissue Culture	3+0	2. Research Thesis	3+0
3. Biochemistry-II	2+1	3. Animal Biotechnology	3+0		
4. Cell Biology	2+1	4. Virology	3+0		
5. Classical Genetics	3+0				
6. Analytical Chemistry & instrumentation	2+1				
7. Molecular Biology	3+0				
8. Introduction to Biotechnology	3+0				
9. Immunology	2+1				
10. Methods in Molecular Biology	1+2				
11. Genetic Resources and Conservation	3+0				
12. Microbial Biotechnology	2+1				
13. Probability, Biostatistics, and Logical Analysis	3+0				
14. Principle of Biochemical Engineering	2+1				
15. Agriculture Biotechnology	3+0				
16. Health Biotechnology	2+1				
17. Environmental Biotechnology	2+1				
18. Food Biotechnology	2+1				
19. Genomics & Proteomics	3+0				
20. Bioinformatics	1+2				
21. Industrial Biotechnology	2+1				
22. Research Methodology & Skills Enhancement	3+0				
23. Seminar-l	l+0				
24. Seminar-II	1+0				
25. Fermentation Biotechnology	2+0				
26. Nanobiotechnology	2+0				
27. Pathophysiology	3+0				
28. Molecular Diagnostics	3+0				

ASSESSMENT METHODS

The examinations for BS Biotechnology are conducted semester wise through centralized examination department. Assessments are both theoretical and practical based on the requirements of a specific course. An internal evaluation by the respective faculty members based on pre-defined scoring criteria is also included in the assessment. A student needs to pass the previous semester's courses, including any pre-requisites, before moving onto the next semester. All 46 courses, including disciplinary and interdisciplinary courses along with credit hour-based capstone research projects, must be passed in order to claim the degree.

NUMBER OF STUDENTS GRADUATED AND STUDYING

Year of Enrollment	No. of Students Enrolled	No. of Students Graduated
2016	76	68
2017	100	93
2018	100	97
2019	100	93
2020	100	N/A
2021	100	N/A
2022	100	N/A
2023	100	N/A

Inauguration of New Dedicated Building of Dow College of Biotechnology

The new dedicated building of Dow College of Biotechnology has been inaugurated on 15th March 2023. The formal inauguration was done by Prof. Dr. Ahsan Iqbal Choudhary, Federal Minister of Planning Commission and Development, Pakistan.

کراچی: ڈاؤ یونیورسٹی اوجھا کیمپس میں ایڈوانسڈ مالیکیولر جینیٹکس اینڈ جینومکس لیب کے افتتاح، ڈاؤ فلائی ریسرچ لیب اینڈ اسٹاک اور کالج آف بائیوٹیکنالوجی کے معائنے کے بعد مہمانِ خصوصی وفاقی وزیر پروفیسر احسن اقبال چوہدری اور وائس چانسلر پروفیسر محمد سعید قریشی خطاب کر رہے ہیں

FACILITIES

The Dow College of Biotechnology (DCoB) is a centrally air-conditioned facility holding a dedicated floor in Serobiology building located in the Southeast of the Dow University of Health Sciences, Ojha Campus. DCoB has three (03) state of the art academic and research laboratories equipped with all basic and advanced instruments which are required for biotechnology research. DCoB also possesses Drosophila research lab and drosophila stock center and dedicated animal and plant cell culture laboratories. DCoB is holding three (03) lecture halls equipped with multimedia facilities and capacity of 100 students in each. A dedicated and well-equipped seminar room for postgraduate students is also a part of DCoB facility. In-house advance library with recent editions of all basic and advanced biotechnology books is also a wonderful part of DCoB to facilitate students learning.

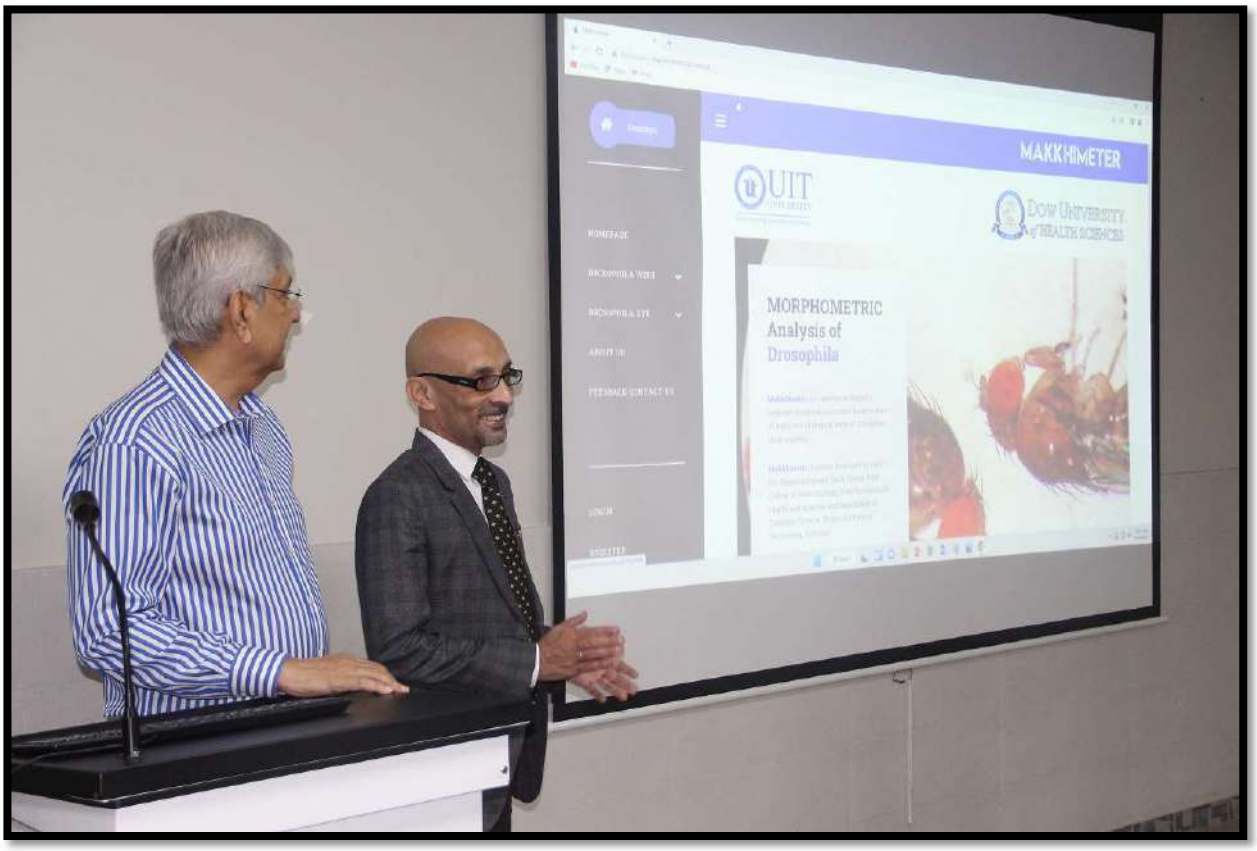
Academic and Research Laboratories

Dow Fly Research Lab and Stock Center

Dow College of Biotechnology has a dedicated Drosophila research facility “Dow Fly Research Lab and Stock Center”. The facility is first of its kind in Pakistan. The facility provides services for Bioactive Molecule Screening, Oncogenicity and Teratogenicity testing, Hepatotoxicity and Nephrolithiasis testing in animal model.

Inauguration of AI Based Image Processing Tool (MAKKHIMETER)

The Inauguration of AI based image processing tool MAKKHIMETER for morphometric analysis of *Drosphila melanogaster* was done by Honorable Vice Chancellor, Prof. Muhammad Saeed Quraishi (*T.I.*) on 14th June 2023.



Bioinformatics Laboratory

A dedicated bioinformatics lab is equipped with high technology equipment's of 20 computers with updated software and servers, capable of doing varieties of bioinformatics analysis and effective learning.

Lecture Halls

The college has three large lecture halls and one seminar room for conducting lectures which are equipped with computers connected with multimedia to facilitate the delivery of lectures. The lecture halls have whiteboards to facilitate further learning of the students.

College Library

The DCoB library has a vast collection of multidisciplinary content which fulfills ever-evolving needs of academic clientele. The collection includes updated books of variety of disciplines that include Biotechnology, Microbiology, Biochemistry, Organic and Inorganic Chemistry, Physiology, Pathology, Immunology, Virology, Tissue Culture Techniques, Pharmaceutical Sciences, Plant Biotechnology, Industrial Biotechnology, Economics, Molecular Biology and Bioethics.

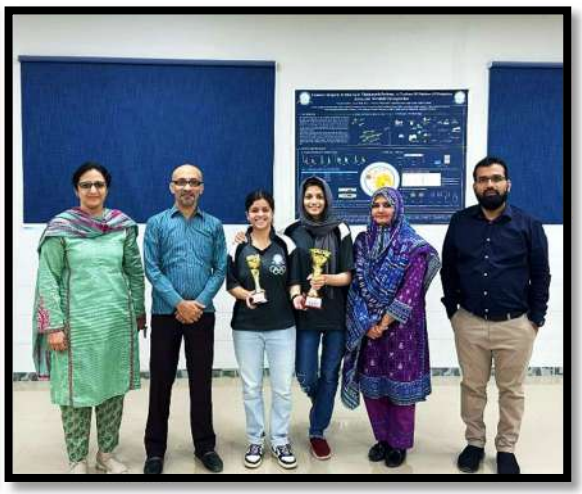
Bioprocessing Unit

Dow College of Biotechnology is also furnished with a large-scale Bioprocessing Unit which is a Plant scale fermenter system. The unit is procured from SiDoLim, Silver Double Limited, world-wide leading manufacturer and supplier. The unit has a capacity of 500 L that fulfills all requirements of modern fermentation technology with the aim of mass production at industrial scale fermentation process. This will allow students to witness the production of biotechnological nature at an industrial scale.

EXTRACURRICULAR ACTIVITIES

ORIENTATION DAY OF DCoB-2023

SPORTS TEAMS OF DCoB



MEDIA EXPOSURE OF DCoB STUDENTS

PARTICIPATION OF DCoB FACULTY AND STUDENTS IN NATIONAL AND INTERNATIONAL SCIENTIFIC EVENTS

ACHEIVEMENTS AND RECENT PRIZES AWARDED TO DCoB STUDENTS


سوزِ سخن
دوم پوزیشن
2nd Prize Winner
Rs.60,000/-
Sixty thousand only
7th All Pakistan
DUHS-DICE
Health Innovation Exhibition
4th November 2022 | DUHS (Ojha) Campus
KAIR PHARMA
SHOWCASING OVER 250 INNOVATIVE RESEARCH PROJECTS
FROM MORE THAN 40 UNIVERSITIES ACROSS PAKISTAN

SELECTED INTERNATIONAL PUBLICATIONS OF DCoB FACULTY AND STUDENTS FROM 2020 ONWARDS

1. Mehdi F, Riaz Z, Javed U, Aman A, Galani S. Expression of Sucrose Metabolizing Enzymes in Different Sugarcane Varieties under Progressive Heat Stress. Frontiers in Plant Science.; 2023 October 16; 14:1269521.

2. Israr F, ul Hasan SM, Hussain M, Hasan A. Investigating In-Situ Expression of Neurotrophic Factors and Partner Proteins in Irreversible Pulpitis. Journal of Endodontics. 2023 Sep 3.

3. Amanullah A, Arzoo S, Aslam A, Qureshi IW, Hussain M. Inbreeding-Driven Innate Behavioral Changes in Drosophila melanogaster. Biology. 2023 Jun 28;12(7):926.

4. Khan N, Perveen K, Hussain M, Qadeer-Malik R, Sharafat S. Comparative Histological Analysis of Cerebellum of Representative Species of Elasmobranchii. International Journal of Morphology. 2023 Apr;41(2):383-8.

5. Mustansar T, Mirza T, Hussain M. RAS gene mutations and histomorphometric measurements in oral squamous cell carcinoma. Biotechnic & Histochemistry. 2023 Apr 5:1-9.

6. Kamran DE, Hussain M, Mirza T. Investigating In-Situ Expression of c-MYC and Candidate Ubiquitin-Specific Proteases in DLBCL and Assessment for Peptidyl Disruptor Molecule against c-MYC-USP37 Complex. Molecules. 2023 Mar 7;28(6):2441.

7. Gul A, Ahmed D, Fazil MM, Aslam T, Rashid MA, Khan H, Ali A, Ali S. Biofabrication of silver nanoparticles using Spirulina platensis: In vitro anti-coagulant, thrombolytic and catalytic dye degradation activity. Microscopy Research and Technique. 2023 May 26.

8. Wajdan N, Aslam K, Amin R, Khan S, Ahmed N, Lal A, AlHamdan EM, Vohra F, Abduljabbar T, Heboyan A. Anti-fungal efficacy of Miswak Extract (Salvadora Persica) and commercial cleaner against Candida albicans on heat cured polymethylmethacrylate denture base. Journal of Applied Biomaterials & Functional Materials. 2023 Apr; 21:22808000231165666.

9. Shahbaz U, Basharat S, Javed U, Bibi A, Yu XB. Chitosan: a multipurpose polymer in food industry. Polymer Bulletin. 2023 Apr;80(4):3547-69.

10. Hussain M, Siddiqui F, Omer SM, Amanullah A, Jabeen N, Kantarcioglu B, Fareed J. Molecular Systems Network Predicts Sars-Cov-2 NSP3 and Orf6 Role in COVID-19 Related Thrombotic Events. Blood. 2022 Nov 15;140(Supplement 1):11216-7.

11. Naqvi F, Dastagir N, Jabeen A. Honey proteins regulate oxidative stress, inflammation and ameliorates hyperglycemia in streptozotocin induced diabetic rats. BMC Complementary Medicine and Therapies. 2022 Dec;23(1):1-3.

12. Hussain M, Amanullah A, Aslam A, Raza F, Arzoo S, Qureshi IW, Waheed H, Jabeen N, Shabbir S, Sayeed MA, Quraishy S. Design and immunoinformatic assessment of candidate multivariant

mRNA vaccine construct against immune escape variants of SARS-CoV-2. Polymers. 2022 Aug 10;14(16):3263.

13. Ali S, Shalim E, Farhan F, Anjum F, Ali A, Uddin SM, Shahab F, Haider M, Ahmed I, Ali MR, Khan S. Phase II/III trial of hyperimmune anti-COVID-19 intravenous immunoglobulin (C-IVIG) therapy in severe COVID-19 patients: study protocol for a randomized controlled trial. Trials. 2022 Nov 8;23(1):932.

14. Gul A, Khan S, Arain H, Khan H, Ishrat U, Siddiqui M. Three-phase partitioning as an efficient one-step method for the extraction and purification of bromelain from pineapple crown waste. Journal of Food Processing and Preservation. 2022 Nov;46(11):e16973.

15. Hussain M, Amanullah A, Aslam A, Raza F, Arzoo S, Qureshi IW, Waheed H, Jabeen N, Shabbir S, Sayeed MA, Quraishy S. Design and immunoinformatic assessment of candidate multivariant mRNA vaccine construct against immune escape variants of SARS-CoV-2. Polymers. 2022 Aug 10;14(16):3263

16. Zainulabid UA, Mat Yassim AS, Hussain M, Aslam A, Soffian SN, Mohd Ibrahim MS, Kamarudin N, Kamarulzaman MN, Hin HS, Ahmad HF. Whole genome sequence analysis showing unique SARS-CoV-2 lineages of B. 1.524 and AU. 2 in Malaysia. PloS one. 2022 Feb 25;17(2):e0263678.

17. Sahar N, Arif S, Iqbal S, Riaz S, Fatima T, Ara J, Banks J. Effects of drying surfaces and physical attributes on the development of Aflatoxins (AFs) in red chilies. Journal of Food Processing and Preservation. 2022 Feb;46(2): e16173.

18. Shabbir A, Waheed H, Ahmed S, Shaikh SS, Farooqui WA. Association of salivary Cathepsin B in different histological grades among patients presenting with oral squamous cell carcinoma. BMC Oral Health. 2022 Mar 8;22(1):63.

19. Aman A, Shahid F, Pervez S. Exploration of a three-dimensional matrix as micro-reactor in the form of reactive polyaminosaccharide hydrogel beads using multipoint covalent interaction approach. Biotechnology Letters. 2022 Feb;44(2):299-319.

20. Gul A, Siddiqui M, Arain H, Khan S, Khan H, Ishrat U. Extraction, partial purification and characterization of bromelain from pineapple (Ananas comosus) crown, core and peel waste. Brazilian Archives of Biology and Technology. 2021 Jul 5;64.

21. Majeed MM, Ahmed I, Roome T, Fatima T, Amin R. Association between interleukin-1β gene polymorphism and chronic periodontitis. European Journal of Dentistry. 2021 Jul 24;15(04):702-6.

22. Batool TS, Hussain M, Masnoon J, Abdullah A, Ali S, Shahzad S, Raza S. Investigating sequence variation in the PNPi protein gene of Puccinia striiformis f. sp. tritici and its interaction with wheat NPR1 protein. Journal of Plant Pathology. 2021 Nov; 103:1231-41.

23. Khan ZM, Waheed H, Khurshid Z, Zafar MS, Moin SF, Alam MK. Differentially expressed salivary proteins in dental caries patients. BioMed Research International. 2021 Oct 14;2021.

24. Raza F, Hussain M. Birth and death of CYLD paralogues in vertebrates. Gene Reports. 2021 Sep 1; 24:101190.

25. Khan ZM, Waheed H, Khurshid Z, Zafar MS, Moin SF, Alam MK. Differentially expressed salivary proteins in dental caries patients. BioMed Research International. 2021 Oct 14;2021.

26. Zehravi M, Wahid M, Ashraf J, Fatima T. Whole-Exome Sequencing Identifies Small Mutations in Pakistani Muscular Dystrophy Patients. Genetic Testing and Molecular Biomarkers. 2021 Mar 1;25(3):218-26.

27. Amin R, Khan S, Zeb TF, Ali S, Baqai N, Baqai M, Shuja S. Knowledge and attitudes toward genetically modified (GM) food among health sciences university students in Karachi, Pakistan. Nutrition & Food Science. 2021 Sep 6;51(7):1150-62.

28. Gul A, Siddiqui M, Arain H, Khan S, Khan H, Ishrat U. Extraction, partial purification, and characterization of bromelain from pineapple (Ananas comosus) crown, core and peel waste. Brazilian Archives of Biology and Technology. 2021 Jul 5;64.

29. Ali S, Uddin SM, Shalim E, Sayeed MA, Anjum F, Saleem F, Muhaymin SM, Ali A, Ali MR, Ahmed I, Mushtaq T. Hyperimmune anti-COVID-19 IVIG (C-IVIG) treatment in severe and critical COVID-19 patients: A phase I/II randomized control trial. EClinicalMedicine. 2021 Jun 1;36.

30. Ali S, Uddin SM, Ali A, Anjum F, Ali R, Shalim E, Khan M, Ahmed I, M Muhaymin S, Bukhari U, Luxmi S. Production of hyperimmune anti-SARS-CoV-2 intravenous immunoglobulin from pooled COVID-19 convalescent plasma. Immunotherapy. 2021 Apr;13(5):397-407.

31. Hussain M, Shabbir S, Amanullah A, Raza F, Imdad MJ, Zahid S. Immunoinformatic analysis of structural and epitope variations in the spike and Orf8 proteins of SARS-CoV-2/B. 1.1. 7. Journal of medical virology. 2021 Jul;93(7):4461-8.

32. Batool TS, Hussain M, Masnoon J, Abdullah A, Ali S, Shahzad S, Raza S. Investigating sequence variation in the PNPi protein gene of Puccinia striiformis f. sp. tritici and its interaction with wheat NPR1 protein. Journal of Plant Pathology. 2021 Nov; 103:1231-41.

33. Raza F, Hussain M. Birth and death of CYLD paralogues in vertebrates. Gene Reports. 2021 Sep 1; 24:101190.

34. Hussain M, Shabbir S, Amanullah A, Raza F, Imdad MJ, Zahid S. Immunoinformatic analysis of structural and epitope variations in the spike and Orf8 proteins of SARS-CoV-2/B. 1.1. 7. Journal of medical virology. 2021 Jul;93(7):4461-8.

35. Hussain M, Jabeen N, Raza F, Shabbir S, Baig AA, Amanullah A, Aziz B. Structural variations in human ACE2 may influence its binding with SARS-CoV-2 spike protein. Journal of medical virology. 2020 Sep;92(9):1580-6.

36. Uddin N, Hussain M, Rauf I, Zaidi SF. Identification of key pathways and genes responsible for aggressive behavior. Computational biology and chemistry. 2020 Oct 1; 88:107349.

37. Hussain M, Jabeen N, Shabbir S, Udin N, Aziz B, Amanullah A, Raza F, Baig AA. Dataset for homologous proteins in Drosophila melanogaster for SARS-CoV-2/human interactome. Data in Brief. 2020 Oct 1; 32:106082.

38. Hussain M, Jabeen N, Amanullah A, Baig AA, Aziz B, Shabbir S, Raza F, Uddin N. Molecular docking between human TMPRSS2 and SARS-CoV-2 spike protein: conformation and

intermolecular interactions. AIMS microbiology. 2020;6(3):350.

39. Shahid F, Ansari A, Aman A, Qader SA. A comparative study among different protocols of immobilization of dextranase using chitin as a matrix. Catalysis Letters. 2020 Mar; 150:613-22.

40. Nawaz R, Gul S, Amin R, Huma T, Al Mughairbi F. Overview of schizophrenia research and treatment in Pakistan. Heliyon. 2020 Nov 1;6(11).

41. Grazielle-Silva V, Zeb TF, Burchmore R, Machado CR, McCulloch R, Teixeira SM. Trypanosoma brucei and Trypanosoma cruzi DNA mismatch repair proteins act differently in the response to DNA damage caused by oxidative stress. Frontiers in Cellular and Infection Microbiology. 2020 Apr 16; 10:154.

RESARCH GRANTS AWARDED TO DCoB FACULTY

1. "Novel approach to combat antimicrobial resistant fungal infections by epigenetic regulation; Expression profiling of histone deacetylases and screening of novel deacetylases inhibitors as potential therapeutic agents for antifungal resistant *C.albicans* infection. Research grant, Awarded by Health Research Institute (HRI), National Institute of Health (NIH) Grant No: SG/22/R3-20/RDC/1640. (1.8 million PKR-Dated: 14-04-2023).

2. Polymorphism in IFN-γ and IL-10 genes and risk of Mtb infection in type II diabetes patients in Karachi, Pakistan. Research grant, Awarded Health Research Institute (HRI), National Institute of Health (NIH). Grant No: SG-22/R3-27/RDC/DUHS/2025.
   (2 million PKR 1.5Yr-Dated: 25-05-2023).

3. "Development of Dow Fly Research Lab and Stock Center", Funded by Dow University of Health Sciences (1.4 million PKR).

4. "Poultry Vaccine against Ranikhet, Bird Flu and Gumboro using Indigenous Viral Strain" Funded by Funded by Dow University of Health Sciences (3 million PKR).

5. "In-Vitro and in-Vivo Studies of Camel Milk Proteins and Peptides - A Potential Therapeutic Approach towards Liver Cirrhosis", Awarded by International Foundation for Science (IFS), Swedon.

6. "Small Variations for Big Changes", Awarded by European Society for Evolutionary Biology (ESEB), UK.

7. "Screening COVID-19 Vaccinated and Unvaccinated Population for Hematological Markers, Awarded by Loyola University, Chicago-USA.

8. "Development of Thrombosis Model for Screening of Antithrombotic Drugs", Awarded by Loyola University, Chicago-USA

9. "Demonstration and Promotion of a Series of Tuberculosis Treatment and Prevention Products", Awarded by Institute of Biophysics-Chinese Academy of Sciences (IBP-CAS), China.

10. “Development of Pilot Scale System for Phycoremediation of Textile Effluent with Concomitant Production of Algal Biomass”, Awarded by Higher Education Commission, Pakistan.

11. “Development of Raloxifene-Loaded Self-Nanoemulsifying Drug Delivery System (SNEDDS) with Enhanced Bioavailability Potential: A Therapeutic Implication in Osteoporosis”, Awarded by Higher Education Commission, Pakistan.

12. “Evaluation of Anti-Rheumatic Potential of Ticagrelor in Rheumatoid Arthritis Fibroblast-like Synoviocytes via Modulation of NLRP3 Inflammasome”, Awarded by Higher Education Commission Sindh, Pakistan.

13. “Error Rate and Coefficients Quantification of Neurological Defects due to Consanguineous Mating using *Drosophila melanogaster* Model”, Awarded by Vice Chancellors' Seed Funding Initiative (VCSFI), Karachi, Pakistan

14. “Development of *Drosophila melanogaster*-Based Assay System for Screening of Carcinogenic Compounds”, Awarded by Vice Chancellors' Seed Funding Initiative (VCSFI), Karachi, Pakistan.

15. “Isolation, Purification and Characterization of Bioactive and Anti-cancerous Small Molecules from *Oxalis corniculate*”, Awarded by Vice Chancellors' Seed Funding Initiative (VCSFI), Karachi, Pakistan.

16. “Osteoinductive Potential of Selenium Nanoparticles via Regulation of Oxidative Stress in Human Umbilical Cord Derived-Mesenchymal Stem Cells: A Promising Therapeutic Approach in Bone Disorders”, Awarded by Vice Chancellors' Seed Funding Initiative (VCSFI), Karachi, Pakistan.

17. “*In-vitro* Propagation and Enhanced Cannabinoids Production of *Cannabis Sativa* L. (Industrial Hemp)”, Awarded by Vice Chancellor’s Seed Funding Initiative (VCSFI), Karachi, Pakistan.

18. “Investigating Protein Interaction of Cancer Associated Ubiquitin Specific Proteases”, Awarded by Higher Education Commission, Pakistan.

19. “Establishment of high cell density culture of *Sacchromyces boulardii* and scale up using bench scale bioreactor”: Demonstration of lab scale probiotic production”, Awarded by Higher Education Commission, Pakistan.

20. “Development of first Commercial scale citric acid production plant in Pakistan by submerged fermentation of *Aspergillus niger* using cane molasses as raw material; A milestone yet to be achieved”, Awarded by Higher Education Commission, Pakistan.

21. “Hemicellulosic furfural production from sugarcane bagasse”, Awarded by Higher Education Commission, Pakistan.

22. “Plantation drive for *Moringa olifera* (Sohanghna) plant across university campus and awareness campaign regarding its nutritional and medicinal value”, Awarded by Higher Education Commission, Pakistan.

23. “Mass production of commercially important micro algae through distillery effluent and selection of specific algal strains”, Awarded by Pak Ethanol (PVT) Limited, Pakistan.

INTERNATIONAL INSTITUTIONAL LINKAGES

Dow College of Biotechnology has strong collaborative research links with universities around the world. The numbers are growing each year.

- Loyola University, USA
- Chapman University, USA
- Niversite de Lausanne Hospital Opthalmique Jules-Gonin Lausanne, Switzerland
- Department of Pathology and Immunology PATIM, University of Geneva, Switzerland
- Universiti Malaysia Pahang (UMP), Malaysia
- RHnanopharmaceuticals, USA

NATIONAL INSTITUTIONAL LINKAGES

Dow College of Biotechnology has also established scientific collaboration with various national institutes and universities.

- Sindh Institute of Animal Health (SIAH)
- Usman Institute of Technology (UIT)
- Shaheed Benazir Bhutto Women University (SBBWU), Peshawar
- Z.H.Z Centre of Proteomics, University of Karachi
- Institute of Sustainable Halophyte Utilization (ISHU), University of Karachi
- International Center for Chemical and Biological Sciences (ICCBS), University of Karachi
- Dr. A. Q. Khan Institute of Biotechnology and Genetic Engineering (KIBGE), University of Karachi
- Jinnah University for Women
- Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST)

FUTURE PROSPECTS

BS Biotechnology opens a wide range of career opportunities due to the multidisciplinary nature of the program. Globally, Biotechnology is an emerging field of science with an ever-increasing demand for biotechnology graduates. The past two years of COVID-19 pandemic has profoundly demonstrated the importance of Biotechnology. The curriculum of this program would put students in a strong position in the market for careers in Genetic Engineering, Cell & Molecular Biology, Stem cell, Biochemistry, Molecular Genetics, Biotechnology, Microbiology, Diagnostics and Bioinformatics. Research and development opportunities can be availed not only in hospitals and public health laboratories but also in major industries of pharmaceuticals, food, and agriculture.

Students graduating from this program will be prepared for jobs that provide research and development breakthrough products and technologies to combat debilitating and rare diseases, reduce our environmental footprint, feed the hungry, use less and cleaner forms of energy, and have safer, cleaner, and more efficient industrial manufacturing processes. Jobs which are directly related to the degree pertains to the research and development field including Biomedical scientist, Clinical Research Associate, Food Technologist, Microbiologist, Pharmacologist and Research Scientists. Additionally, BS Biotechnology degree may also be useful for careers in Ecology, Forensic Medicine, Science Writing and Environmental Science.

FACULTY

Prof. Dr. Mushtaq Hussain
Principal
Ph.D. in Genetics
Genomics and Systems Medicines
University of Glasgow, UK

Dr. Humera Waheed
Vice Principal
Ph.D. in Biochemistry
ICCBS,
University of Karachi

Dr. Rafat Amin
Associate Professor
Ph.D. in Natural Sciences
Eberhard Karls Universitat
Tubingen, Germany

Dr. Sadaf Khan
Associate Professor
Ph.D. in Biochemistry
University of Western Australia, Australia

Dr. Tehseen Fatima
Associate Professor
Ph.D. in Infection and Immunity
University of Glasgow, UK

Dr. Anum Gul
Assistant Professor
Ph.D. in Molecular Medicine
ICCBS,
University of Karachi

Dr. Sheeba Naz
Assistant Professor
Ph.D. in Biotechnology
ICCBS,
University of Karachi

Dr. Faiza Nadeem
Assistant Professor
Ph.D. in Biotechnology
KIBGE,
University of Karachi

Dr. Salman Ahmed
Assistant Professor
Ph.D. in Molecular Medicine
ICCBS,
University of Karachi

Dr. Nida Dastagir
Assistant Professor
Ph.D. in Molecular Medicine
ICCBS,
University of Karachi

Dr. Maheera Moin
Assistant Professor
Ph.D. in Chemistry
Sheffield Hallam University, UK

Dr. Urooj Javed
Assistant Professor
Ph.D. in Biotechnology
KIBGE,
University of Karachi

Engr. Tabish Ali
Senior Lecturer
BE (Chemical Eng),
ME (Environmental Eng)
NED University

Ms. Anusha Amanullah
Lecturer
M.Phil. (Biotechnology)
Dow University of Health Sciences

Ms. Iqra Ahmed
Instructor
M.Phil. (Biotechnology)
Dow University of Health Sciences

Ms. Aliya Shujaat
Lab Manager
BS (Biotechnology)
University of Karachi

Ms. Sehrish Butt
Lab Manager
M.Sc. (Genetics)
University of Karachi

Ms. Hanzala Khan
Lab Manager
BS (Microbiology)
Jinnah University for Women

Ms. Ruqiya Fatima
Lab Manager
BS (Microbiology)
Jinnah University for Women