



PERSPECTIVE PLAN
For
Creating a ‘Best Practice University’

Shoolini University of
Biotechnology
And
Management Sciences
(SUBMS)

SOLAN (H.P.)

FOREWORD

Shoolini University of Biotechnology and Management Sciences has its roots in the Shoolini Institute of Life Sciences and Business Management Sciences (SILB), which was conceived by me as the core member of the Foundation for Life Sciences and Business Management, the sponsoring body of the university. After having served as the Vice Chancellor of an Agricultural University and as Senior Scientific Advisor Biotechnology to Himachal Government, I thought of venturing in to private education. The idea of establishing an institute of higher learning in biotechnology was visualized during 2002 at the time of inauguration of Jay Pee University of Information Technology. The result was SILB, which became synonymous with quality education provider as it achieved tremendous success in producing toppers from Himachal Pradesh University year after year. With these achievements, the Foundation (Society registered under Societies Registration Act) decided to establish the University which was sanctioned in October 2009 and inaugurated on April 11, 2010.

The ambitious vision, to be among top 200 global universities by 2022, was set up at a time when none of the Indian Universities was in this elite group. It was envisaged that for achieving the vision, the university should have sound governance and dedicated researchers coupled with adequate infrastructure, which are known to form pillars of strength of a great university.

From a study of various criteria for QS and the TIMES rankings, it was realized that in the first six years, strong research base has to be built. It was also decided to adopt a four-tier level of faculty development with distinguished and decorated academicians and scientists at the top tier, followed by mid-career post docs from Centres of Excellence from abroad, third tier included young, dynamic and NET qualified PhDs and lastly in house qualified PhD scholars in pre-identified disciplines. With this background, a 12-year prospective plan in two phases of six years each was thought off for achieving overall objectives of entering the world's Top 200 Universities. The first phase (2010-2016) envisaged endevours to establish quality learning and research environment by supporting research teams and raising research to global standards in all fields, and enter the elite club of top 200 during the second phase (2017-2020).

This document embodying first phase of the 'Perspective Plan' incorporates the description of university's sponsoring body, advisors, objectives, faculties, schools and courses of study. Twenty Schools are proposed in eight faculties for developing a specialized university. Lastly it also lays emphasis on infrastructure requirement and budgetary provisions.

(P.K.Khosla)

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ACADEMIC STRENGTH OF THE SPONSORING BODY

The **Foundation for Life Sciences & Business Management (FLSBM)**, Anand Campus, The Mall Solan, HP, is the Sponsoring Body of Shoolini University. The Key objective of the Foundation are enumerated in **Exhibit I**.

Prof P.K.Khosla (Former Vice Chancellor, H.P. Agricultural University) discussed the proposal for launching higher education in Biotechnology, Management Sciences and allied disciplines with Mr. Ramesh K. Mehan (BE, MBA), an entrepreneur technocrat from USA with roots in Himachal Pradesh, during his visit to India in December, 2003. Prof Khosla also joined hands with Mr Satish Anand (a local businessman with vast experience in infrastructure development), so as to create three strong pillars, i.e. finance, academic and infrastructure which are vital for the success of the project. In this regard, Mr Mehan wrote a letter to the Government of Himachal Pradesh in which he expressed his willingness to undertake this project in partnership with the aforesaid promoters. Consequently, this project was submitted for consideration of the government in May, 2004. Meanwhile, the Shoolini Institute of Life Sciences and Business Management, affiliated to H.P. University, Shimla was started. However, it took five years to get clearance from the Himachal Pradesh Government and approval for establishing Shoolini University of Biotechnology and Management Sciences was issued on October 16, 2009.

The majority of the Executive Members of the Foundation are academic professionals with distinguished background. It was also decided that the members of the Society, who are competent to hold statutory positions and are willing to devote full or part time, shall be persuaded to take regular positions in the University. The Foundation nominated Mr Ramesh Mehan as the Chancellor of the University and Prof PK Khosla, Ex Vice-Chancellor, HPAU and Former Advisor, Biotechnology, HP Govt. was appointed as the first Vice Chancellor of Shoolini University of Biotechnology and Management Sciences.

The University is planned to be different from other private universities being sponsored, funded, managed and administered by the academicians. Prof P.K.Khosla, Vice Chancellor of the university is also the Secretary of the Foundation and it is hoped that his dual role will help to

build a world class university while maintaining high values and transparency. It was also decided that the university will keep its finances neat and clean without any spec of greed or corruption. It shall always maintain high standards of transparency and integrity while transecting financial deals. The Foundation will maintain its charitable character. Its service to the society will be gauged by offering scholarships to meritorious students along with merit-cum-means scholarships to down trodden rural and poor students for elevating their social status in the society.

The following are the officials of the Sponsoring Body and its two key Committees constituted to undertake its task of setting up a prestigious university in the region:

Patron	Ms. Kamal Vasudeva , MA, BT. A leading Educationist, Ex- member Education Commission, GOI; Member Task Force on Primary Education, H P Govt	
President	Ms. Saroj Khosla , MA B Ed, ICE (Oxford), Retired Principal DIET, Solan,	
Secretary	Prof PK Khosla , Ph.D. Former Vice Chancellor, HPAU Palampur and Sr. Scientific Advisor Biotechnology to Govt. of Himachal Pradesh	
Treasurer	Mr. Vishal Anand , Economics (Hons). Microsoft Certified Professional, MBA (Finance), Business Manager	
Members		
1.	Mr. Ramesh K Mehan BE, MSIE, Kansas State University, MBA, University of Dayton, USA. Professional and Industrialist, USA	
2.	Mr. Satish Anand B.Com, Businessman	
3.	Mr. Ashish Khosla BE, MBA (IIM Calcutta), Vice President, Union National Bank, Abu Dhabi	
4.	Mr. Atul Khosla , B Tech (IIT Kanpur), PGDBM (JBIBM, Mumbai), Partner A-connect Schweiz, Zurich, Switzerland	
5.	Mr. Gagan Anand , MBA (Coventry University, UK), Business Manager	
Co-opted Members		
1.	Mr. Raj Khosla , B.Tech. (IIT Bombay), MBA, Director, Kaefer Insulteo, Ltd., Thailand	
2.	Ms. Ashoo Khosla , MBBS (Gold Medalist), MBA (ISB, Hyderabad), Project Manager, MNC Trading, Abu Dhabi	
Scientific Committee		
1.	Prof. R C Mahajan	Chairman
2.	Prof S.P.Vij, Ex-Chairman, Botany Dept, P.U.Chandigarh	Member

3.	Dr I P Abrol, former DDG, ICAR, New Delhi	Member
4.	Dr S K Sharma, Director, NBPGR, Pusa Campus, New Delhi	Member
5.	Dr G S Sethi, Prof Emeritus, HPAU, Palampur	Member

The Scientific Committee will meet at least once in two months

Management Committee

1.	Mr Ramesh Mehan., Indian American Entrepreneur 100% shareholder, of five Ohio Corporations	- Chairman
2.	Mr Ashish Khosla,, Ex-Manager Citi Bank, AVP HSBC, VP National Union Bank, Abu Dhabi	- Member
3.	Mr Atul Khosla, Ex-Junior Partner McKenzie, USA, Ex- Country Head, Everest Group (USA), Partner –a- connect Schwiez Zurich	- Member
4.	Mr Sudhir Shukla , Senior Vice President, Yamaha, India	- Member
5.	Mr Raj Khosla , Director, Kaefer Insulteo Ltd., Thailand	- Member
6.	Mr Vishal Anand, Managing Partner, Anand Enterprisers, Solan	

The Management Committee will have frequent video conferencing.

The Foundation of Life Sciences and Business Management was formed to provide higher education, research, and help create new businesses in biotechnology and related areas



Key objectives of Foundation
<ul style="list-style-type: none"> • Promote higher education, research and industry in biotechnology and related areas for the upliftment of the people of Himachal <ul style="list-style-type: none"> – Promote high quality research and education – Create incubation facilities in the area of biotechnology – Provide training and consultancy to entrepreneurs and industry – Promote diversification of farming

Exhibit I

LOCATION AND ESTABLISHMENT OF THE UNIVERSITY

The “Shoolini University of Biotechnology and Management Sciences” (Short name – Shoolini University) is located at Bhajol Village on National Highway (Kumarhatti- Oachghat) at a distance of 13 km from Kumarhatti and with a similar distance from Solan. It is also approachable via off road at 5 km diversion on Solan- Rajgarh road, where in the Foundation has acquired 11 acres of land.

The University is unitary in nature, as applicable to the Private Universities, with jurisdiction in Himachal Pradesh. It shall extend its territory, in the second phase of six years, by opening off-campus Centres, off-shore campus, study Centres or to start distance education, after fulfilling the norms and regulations of the Central Government Regulatory Bodies and Central Government, issued from time to time, and after obtaining the specific approval of the State Government.

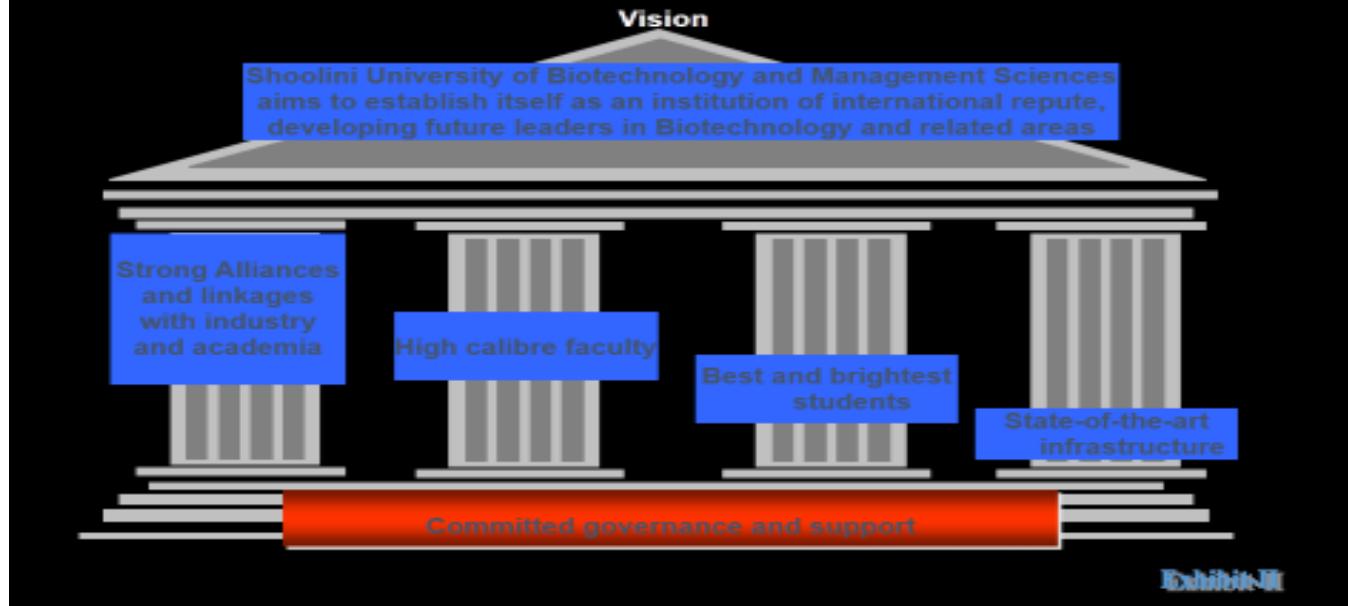
Shoolini University provides an ideal environment for higher learning with a serene and beautiful campus, state-of-the-art facilities and a creative atmosphere conducive to excellence in pursuit of knowledge. It encourages the students to be “balanced-specialists” to excel in their own field, while being well-rounded through personality development and extra-curricular activities.

OBJECTIVES OF THE UNIVERSITY

A key objective of the university is to advance knowledge in Life Sciences and Management and use it for the good of the people. It will be based on an ideal synthesis of education and research, and aim at global excellence with local relevance. The university, while sustaining the highest level of scholarly endeavors, will strive further for the prosperity of the people of India, and the state of HP in particular. It will also network with other institutions, R&D groups and industries in India as well as abroad. In order to achieve these objectives, the University will endeavor to (**Exhibit II & III**)

- create world-class education and training programs at all levels, with supportive state-of-the-art infrastructure facilities,
- produce graduates in biotechnology and related sciences and management disciplines, of outstanding ability and versatility,
- produce researchers, scientists and technologists in cutting edge areas of biotechnology and management sciences for solving problems of the state and national interests and improving the quality of life,
- create a critical mass of thought leaders, who, through deep research and analysis will be able to provide policy support for emerging issues in biotechnology and business management bearing on the society,
- identify and execute such programs that will create for state as well as India a position of leadership for the university in selective areas,
- create live and vibrant links with industry, academia and researchers nationally and globally through dynamic knowledge networks,
- provide an intellectually stimulating environment in which the scientists, technologists, and business managers from academia, research laboratories and industry can collaborate on projects of scientific, societal, commercial and national significance and
- develop and maintain relationship with centers of excellence in Biotechnology and related Sciences and Management disciplines in India and abroad for education, training and research including distance learning program.

We aspire to create an institution of international repute. Our distinctiveness will emanate from investments in governance, alliances, faculty, students and state of the art infrastructure



VISION AND MISSION OF THE UNIVERSITY

Following the statement of Dr Abdul Kalam, former President of India during a Convocation at Delhi University in 2006, expressing his concern for poor performance of the Indian Universities stated, “I am shocked to learn that none of the Indian University falls in the elite list of 200 globally ranked universities”. This statement inspired me to charter the vision of our proposed university to be amongst the coveted list in twelve years. So in 2010 the mission was adopted to reach this targeted goal by 2022 with the following prime goal.

To be a role model for Private University Education in India

- Build a truly world class research platform
- Aggressively adopt technology to innovate pedagogy
- Attract and retain the best talent
- Be honest, truthful and beyond regulation in all our dealings.

Have a sustainable impact on society in our area of operation

- Passionately work towards Himalayan sustainability
- Provide ‘world class’ quality education and experience to students
- Help students develop relevant skills and behavior for best-in-class careers.

To become a role model to portray that high end research can be possible in private universities-

- Become a research leader in biotech research
- Create patenting and their commercialization for resource generation
- Become a research leader amongst ‘Mountain Universities of the world’

JUSTIFICATION FOR THE UNIVERSITY

Biotechnology, the science to use and manipulate natural living systems, for commercial application, is a knowledge driven technology, based upon the understanding of the structure, function and genetic makeup of living cells, besides flow mechanism of genetic information and responses to chemical and physical signals.

Biotechnology has already made a substantial contribution to development through better health care, enhanced food productivity, improved bioprocess technologies, efficient industrial development processes, and detoxification of hazardous materials. A large number of biotech drugs and vaccines are currently being marketed, accounting for more than 40 billion US\$ market worth and benefiting over 100 million people worldwide. In addition, there are a large number of agri-biotech and industrial biotech products that have helped the mankind enormously.

India is recognized as a mega biodiversity country and biotechnology offers immense possibilities to convert its biological resources into economic wealth and employment opportunities. In fact, the country has been practicing conventional biotechnology for several decades using classical technologies of fermentation for production of vaccines; recovery of metabolites through downstream processing; use of microbes or enzymes for value addition to products; plant breeding, etc. However, during the past decade or so, the country has employed modern biotechnologies (bio-prospecting, micro-propagation, genetic engineering, immunology, cell culture methods, hybridoma) in a big way and has emerged as a major bio-power, poised to cash in on the current global boom in biotechnology. Biotech industry is in fact leading the current technological revolution in the country. It is growing at a rate of 25 percent annually, and by 2020, the sector is expected to create more than one million jobs and to generate more than US\$ 5 billion revenues. With a large consumptive market and stable democracy, the country is a suitable destination for Foreign Direct Investments in industrial sector in general and biotechnology in particular. Himachal Pradesh with a predominantly rural economy and rich biodiversity (7.5 % of the country) needs to cash upon the biotech boom for socio-economic uplift for its populace.

To achieve the goal of self-reliance in this field, the country would require a strong educational and scientific base, clear public awareness about the significance of new biotechnologies and involvement of society in various biological ventures. It will be equally important to establish strong partnership and linkages with the industry from development onwards for the commercialization of technology. In this connection, it is worthwhile to mention that the global economy in the twenty-first century has to rely on a very strong education base. The quality of education and training has to be improved by establishing specialized universities that would become hubs of knowledge-based innovation and growth.

The perspective plan (six years) is conceptualized with the following charter of the university:

- to have a strong linkage with both Industry and Society,
- to provide for effective under-graduate and ambitious post-graduate programs and create a research environment that will provide both excitement and flexibility for faculty and students,
- to utilize and integrate the power of information technology with biological systems,
- to draw upon the rich traditional systems of knowledge and
- to enhance entrepreneurial skills through modern and innovative business principles.

Such a confluence of modernity and tradition will create a unique pedagogy. The university will try to put forth a new paradigm that could serve as a model for other similar universities that may be set up in the future.

COURSES OF STUDY

Biotechnology is multidisciplinary in nature (**Exhibit IV**). Courses in the discipline will be offered at under-graduate, post-graduate including doctoral level in the Faculties of Biotechnology and Applied Sciences and Engineering and Food processing. Basic Sciences and Information Technology being important components of Biotechnology will also form important teaching program of the University in their respective Faculties. The Faculty of Management shall teach under-graduate and post-graduate courses in Business Management with Biotechnology bias. The remaining Faculties, i.e. Pharmaceutical, Human and Animal Health and the Faculty of Social and Legal Studies shall start in the second phase.

The details of following under-graduate (B. Sc./B. Tech.), post-graduate (M.Sc., M.Tech, M. Pharma, MBA, MCA, MA) and Ph.D. (Doctoral) courses are given in the proceeding table:

Nomenclature of Courses	
<i>Faculty of Biotechnology & Applied Sciences</i>	
1.	Ph D
2.	M Phil
3.	M Sc Biotechnology
4.	M Sc Medical Microbiology
5.	M Sc Bio - Informatics
6.	M Sc Industrial Microbiology
7.	M Sc Food Science
8.	B Sc (Hons School) Biotechnology
9	B Sc (Hons School) Bio-Informatics
10.	B Sc (Hons School) Medical Microbiology
11.	B Sc(Hons School) Industrial Micro Biology
<i>Faculty of Basic Sciences</i>	
1.	PhD
2..	M Phil
3.	M Sc Botany
4.	M Sc Physics (Applied Engineering Physics)
5.	M Sc Chemistry (Industrial Chemistry)

6.	M Sc Zoology (Wild Life Conservation)
7.	M Sc Bio Chemistry
<i>Faculty of Engineering & Processing</i>	
1.	B Tech Biotechnology
2.	B Tech Information Technology
3.	B Tech Medical Biotechnology
4.	B Tech Food Technology

<i>Faculty of Pharmaceutical Sciences</i>	
1.	PhD
2.	B Pharma
3.	M Pharma
<i>Faculty of Information Technology</i>	
1.	BCA
2.	MCA
<i>Faculty of Management Sciences</i>	
1.	PhD
2.	MBA
3.	MBA BT
4.	MBA Executive
5.	BBA
<i>Faculty of Social & Legal Studies</i>	
1.	Masters in Patenting & International Law
2.	Masters in Sociology & Science
<i>Faculty of Human & Animal Health</i>	
	Bachelor of Ayurveda
	Bachelor in Veterinary Sciences

Teaching Faculties

The above-mentioned courses shall be allocated to eight faculties in twenty Schools for carrying out the academic and research programs of the University. Each School will include 3–4 Subject Matter Sections integrating various scientific processes and technological advances to serve as a road map for biotechnology education. A due emphasis shall also be laid on the social, ethical, legal and business aspects.

Faculty (Institute) of Biotechnology and Applied Sciences
 Faculty of Basic Sciences

Faculty (Institute) of Engineering and Processing
 Faculty (Institute) of Pharmaceutical Sciences
 Faculty (Institute) of Information Technology
 Faculty of Management Sciences
 Faculty (Institute) of Human and Animal Health
 Faculty (Institute) Socio-Legal Studies

Inception of Faculties:

For each faculty there shall be a separate Institute incorporating two or more Schools for undertaking teaching, research and other related activities. Five faculties will be instituted in the first phase of the project (6 years) while the remaining 3 faculties shall be taken up in the end of the first phase or in the 1st year of second phase.

Faculty	Year of Inception				
	I	II	III	IV	V
Biotechnology and Applied Sciences					
Basic Sciences					
Engineering and Processing					
Pharmaceutical Sciences					
Information Technology					
Human and Animal Health					
Management Sciences					
Socio-Legal Studies					

Schools/Departments in Faculties

The following table includes areas of specializations for twenty Schools included in eight Faculties

Name of Faculty	Key Areas of Research and Teaching
Biotechnology and Applied Sciences	School of Plant and Microbial Technology <ul style="list-style-type: none"> • Genetic Engineering • Enzymology • Immunology • Plant Tissue Culture • Biodiversity
	School of Molecular and Structural Biology <ul style="list-style-type: none"> • Molecular Biology • Proteomics and Genomics • Structural Biology
Basic Sciences	School of Physical and Mathematical Sciences <ul style="list-style-type: none"> • Chemistry (Industrial Chemistry) • Physics (Applied Engineering Physics) • Mathematics • Statistics
	School of Biosciences <ul style="list-style-type: none"> • Microbiology • Genetics • Biochemistry • Biophysics • Biosciences (Botany, Zoology)
Engineering and Processing	School of Engineering <ul style="list-style-type: none"> • Chemical Engineering • Mechanical • Electronics and Communication • Bioinstrumentation
	School of Nanotechnology <ul style="list-style-type: none"> • Nanotechnology • Cybernetics
	School of Food Processing and Nutraceuticals <ul style="list-style-type: none"> • Food Processing • Nutraceuticals
Pharmaceutical Sciences	School of Pharmacology <ul style="list-style-type: none"> • Phytochemistry • Pharmacology • Toxicology
	School of Pharmacognosy <ul style="list-style-type: none"> • Herbal drugs • Natural products/ Resources
	School of Pharmaceuticals <ul style="list-style-type: none"> • Drug Processing • Drug Prospecting

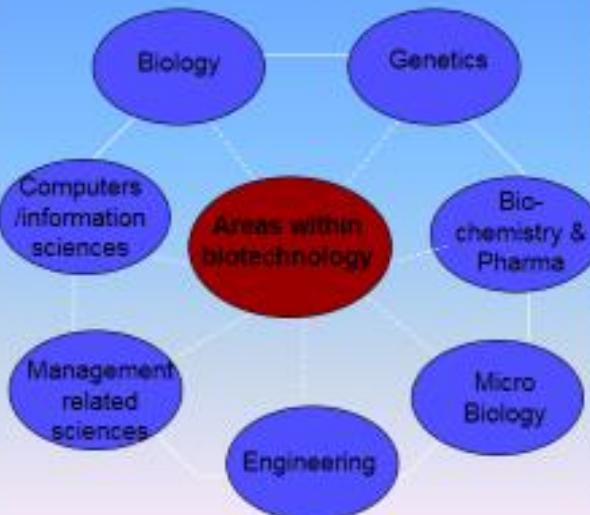
Information Technology	<p>School of Bioinformatics</p> <ul style="list-style-type: none"> • Drug designing • Gene sequencing
	<p>School of Information Technology</p> <ul style="list-style-type: none"> • Computer languages • Computer Applications • Software and Hardware Development
Human and Animal Health	<p>School of Medical Biotechnology</p> <ul style="list-style-type: none"> • Diagnostic kits • Gene therapy • Human Genome Project
	<p>School of Animal Biotechnology</p> <ul style="list-style-type: none"> • Cloning and Embryo rescue • Transgenics • Dairy Microorganisms
Management Sciences	<p>School of Management and Entrepreneurship Development</p> <ul style="list-style-type: none"> • Financial Management • Marketing Management • Human Resource Development • Entrepreneurship Development and Family Business
	<p>School of International Business</p> <ul style="list-style-type: none"> • International Trade • International Finance • International Human Resource Management
	<p>School of Business Economics</p> <ul style="list-style-type: none"> • Biobusiness Management • Business Economics • Transport Economics
Socio-Legal Sciences	<p>School of Sociology</p> <ul style="list-style-type: none"> • Social Sciences (Ethics & Science) • Intellectual Property rights
	<p>School of Legal Sciences</p> <ul style="list-style-type: none"> • Law and Business • Law and Intellectual Property Rights • Ethics and Sciences
	<p>School of Economic Development</p> <ul style="list-style-type: none"> • Development of farmers and Women • Industrial linkages

Being multi-disciplinary, unlikely that individual undergraduate institutes can substitute the need for a university

The beauty of the biotechnology industry is that it has multifaceted requirements unlike the software industry, which needs only homogeneous skills. A company like ours has biologists, chemists, genetic scientists, microbiologists, mechanical to electrical engineers, doctors, lawyers and so on.

- Kiran Manundkar-Shah

Biotechnology- multiple areas, each area needing specialization, interlinked, significant investments



ability IV

HIGH CALIBER FACULTY

The reputation of a university implicitly depends on the quality of its teaching faculty. We shall attract outstanding persons to join the faculty, by offering them attractive compensation/packages, upwards of the UGC norms, by producing consultancy avenues and challenging work environment.

Shoolini University envisages to follow the research driven model for which the appointment procedures of teachers is not only rigorous but preference is given to those who have experience in generating research grant from national and international donors. Teachers shall be paid 3 per cent honoraria in lieu of such efforts, which ordinarily should not be less than Rs. 2000 pm. Post-doctoral/industrial/management experience shall be the essential qualification for the appointment of Readers/Associate Professors and Professors. For lecturers/Assistant Professor, as per the upwards of UGC requirements, Ph Ds with NET (passed) along with 4-5 research papers in journals of repute (with optimum indexing score) and their capability and experience for generating research funds shall be preferred. The confirmation of teachers shall also be subject to the procurement of research/consultancy support from outside agency. The appraisal of the teachers shall be annual with the provision to flexible annual increment system ranging between one to three increments will be created. Those who do not fulfill the aspirations of the University will be warned to improve or else to leave the university.

The University has adopted four tier faculty polity to attract outstanding and experienced teachers. The top tier includes learned and established scholars ‘Senior Professors and Professors of Eminence’. The mid-tier includes Post Doc teachers from internationally acknowledged centres of excellence or holding mid-career positions in corporate sectors. The third tier includes young dynamic and NET qualified PhDs, who have the attributes to excel, while the last tier manned by brilliant teachers who have registered for PhD in pre-determined areas of the specialization.

The total faculty strength would be guided by the number of students in various programs. The total strength of about 2000 students is estimated in the fifth year. The best norms regarding

student's faculty ratio, conducive to creating an environment of research and excellence, will be followed. Since, the University shall focus on innovative research or teaching, the students: faculty ratio shall be as per the UGC norms depending upon the resources available.

RESEARCH PROGRAMS AND FUNDED PROJECTS

Research Programs and their Phasing

Based on the ranking systems for global universities by the QS and the TIMES it was decided to develop a strong research base so that the Shoolini University soon emerges as a small specialized institute. The sustainability of the Himalayan biodiversity shall be the focus area of research. This vision is proposed to be translated into specific, strategic, long-term outcomes that directly relate to the recommendations emerging from the International Year of Mountains, 2002, culminating in the *Bishkek Global Mountain Summit*.

Shoolini University intends to play a modest role in achieving these goals by emerging into a regionally based Mountain Learning and Knowledge Centre. Our mission is to develop and provide integrated and innovative solutions, in cooperation with national, regional, and international partners, which foster action and change for overcoming mountain peoples' economic, social and physical vulnerability. Solutions will be created by identifying, testing and disseminating options.

Research Policy

Purpose: This policy document establishes the research environment in the University within which academic staff and students carry out their research. It also provides framework for the development and implementation of research management in Shoolini University of Biotechnology and Management Sciences.

Research Philosophy: Shoolini University in pursuit of its vision 'To be in top 200 global universities by 2022' and quest for creating knowledge endeavors to move into the club of internationally reckoned centers of research and education, the University has therefore adopted a research driven model which seeks to blend expertise in life sciences and engineering with the principles and practices of business management so that cutting edge technologies and exceptionally skilled human capital could be generated. The five faculties of the university viz. Applied Sciences and Biotechnology, Basic Sciences,

Engineering and Technology, Management Sciences and Liberal Arts, and Pharmaceutical Sciences have been unified by a trans-disciplinary research model.

Since the University is located in the lap of benign Himalayan ecosystem, the research agenda is focused on economic and sustainable development of Himalayan region. Shoolini University's research philosophy essentially therefore, rests upon three verticals that is 1) Harnessing Himalayan biodiversity, its conservation and sustainable management 2) Development of cutting edge technologies to meet current industrial and societal needs and 3) Establishment of Centres of Excellence in areas relevant to pursuing the university's research goals and interinstitutional Collaborations for Research and Development. University is aligning its research goals with emerging challenges in health care, food, energy conservation, sustainable management of bioresources and clean development along with stimulating jobs and economic development with its focus on specific needs of Himalayan region. The research programmes are therefore designed to provide such interdisciplinary solutions as are replicable, techno-commercially feasible and could be scaled up. Based on the three verticals of university's research philosophy, thematic areas of the research programs of the university have been prioritized as broughtout hereunder:

1. Harnessing Himalayan Biodiversity, its Conservation and Sustainable Management

Himalayan ecosystem being a colossal reservoir of biological and geological wealth in the form of forest cover, plant diversity; macro and micro flora and fauna, water, snow, and glaciers, offers on one hand an opportunity to develop new bio products as well as monitor climate change, yet on the other it is a challenge to conserve and sustainably manage the Himalayan resource base. Shoolini University has undertaken this gigantic task of harnessing Himalayan bioresources through convergence of emerging technologies emanating from various disciplines such as Biotechnology, Pharmaceutical sciences, Bioinformatics, Proteomics, Food technology, Nanotechnology, Computer sciences, Electronics and almost entire range of Basic and Social sciences. Himachal Pradesh contributes about 7.5% of the total biodiversity of India and needs to cash upon the biotechnology boom for its socioeconomic development. The Himalayan flora and fauna has not been systematically recorded and there is a need to create the database covering the genetic and phytochemical diversity through clinal variation. The university is also focusing its research efforts for studying the plants for the medicinal properties in areas national health priorities such as cancer, infectious diseases, neglected diseases and diseases specific to the region. Himalayas have emerged as major production areas for fruits, vegetables and flowers. University envisions

to be a center of excellence to study the plant diseases and to devise technologies for food processing for the produce from the region to increase the value and shelf life.

The engineering needs of the Himalayan region are required to be addressed to match the unique strata of the region. University aims to focus its efforts to develop tools and technologies which would help in sustainable development and conservation of the biodiversity while allowing the people of the region to match the economic and social development with other regions of the world.

University also endeavors to study the socioeconomic aspects of the region and devise strategies and solutions to meet the special requirements of the region.

2. Development of Cutting Edge Technologies to Meet Industrial and Societal Needs

Generation of cutting edge technologies and development of end products assumes interdisciplinary dimensions, integrating many disciplines viz. biological, pharmaceutical, chemical, physical, engineering, societal and management sciences. The long time research strategy of Shoolini University is to develop cutting edge technologies by the interface of two or more disciplines. Therefore university's research driven model is founded on integration of concepts, theories, techniques, and perspectives from across the disciplines thus enabling to provide solutions to the problems those are beyond the scope of a single discipline.

Biotechnology itself being an interdisciplinary science integrates biological sciences with Biochemistry, Physics and Mathematics, it finds application in sectors such as food and agriculture, health and environment as well as a number of industries, university has already formulated innovative research projects by converging biotechnology, nanotechnology and pharmaceutical sciences for meeting the defence needs. An interface between Biotechnology, Nanotechnology, Bioinformatics and Pharmaceutical Sciences would open new vistas in drug development, health care and nutrition and other industries. Similarly engineering and technology interface with material and management sciences would lead to the development of renewable energy technology, incubation of the same and scaling it up for business ventures.

3. Establishment of Centers of Excellence for Research and Development

The university has developed detailed project proposals for setting up "Center of Research on Himalayan Sustainability and Development" (CRHSD). The purpose of setting up the research centers is to promote

interdisciplinary collaborative research, within university as well as with researchers from other institutions in India and abroad. The centers would not essentially exist as separate entities but will follow a flexible model with researchers working in the labs/field spread over the Schools of the University contributing to the mission and vision of respective centers. Thus the centers will be modeled to facilitate collaboration and resource sharing between different scientists and to promote projects which have clearly defined deliverable that impact the society.

The university will adopt and implement following research policy in a phased manner to maintain highest standards of research and ensure implementation of research ethics and integrity.

Policy Content and Guidelines

1. Requirement to Undertake Research

- a. All faculty members are expected to conduct research and publish their findings after ensuring intellectual property protection.
- b. All faculty members should where appropriate, seek extramural research funds to support their research.
- c. The requirement to undertake research is a career expectation and will be balanced with their obligations of faculty including teaching and administrative responsibilities.
- d. Nothing in this policy is to be construed so as to prevent Heads of School from allocating teaching and other responsibilities in the light of the research record of faculty.

2. Statutory and Ethics Obligations

- a. Faculty and students are required to carry out their research in compliance with all the University's obligations under legislation and any ethical and contractual obligations
- b. Research projects that involve human or animal subjects must be approved in advance (see the ICMR Ethical Guidelines For Biomedical Research On Human Participants (http://icmr.nic.in/human_ethics.htm), Indian National Science Academy Guidelines for Care and Use of Animals in Scientific Research (http://icmr.nic.in/animal_ethics.htm) and CPCSEA Guidelines for Laboratory Animal Facility (http://icmr.nic.in/bioethics/final_CPCSEA.pdf)

- c. The research conduct policy of the University should be strictly adhered too in all the publications, dissertations, project proposals and other documents of the university.
- d. In case of report of research misconduct by any of the university researchers, the university shall constitute a committee to investigate the misconduct. The committee would submit the recommendations to the Vice Chancellor for necessary action so that the highest standards of research integrity are maintained. The confidentiality of the process and the whistle blower would be ensured in the whole process. The process would be completed within four weeks.
- e. In case of conflict of interest, the university shall constitute a committee to review the conflict and resolve it. The committee would submit the recommendations to the Vice Chancellor for necessary action.

3. Definitions

For purposes of this policy, unless otherwise stated, the following definitions and abbreviations shall apply:

VC	Vice-Chancellor
Academic Staff	Includes all staff that have a contractual obligation to carry out research
PBRF	Performance-Based Research Fund
Research	<p>Research is original investigation undertaken in order to contribute knowledge and understanding and, in the case of some disciplines, cultural innovation or aesthetic refinement. It typically involves enquiry of an experimental or critical nature driven by hypotheses or intellectual positions capable of rigorous assessment by experts in a given discipline. It is an independent*, creative, cumulative and often long-term activity conducted by people with specialist knowledge about the theories, methods and information concerning their field of enquiry. Its findings must be open to scrutiny and formal evaluation by others in the field, and this may be achieved through publication or public presentation.</p> <p>In some disciplines, the investigation and its results may be embodied in the form of artistic</p>

works, designs or performances. Research includes contribution to the intellectual infrastructure of subjects and disciplines (e.g. dictionaries and scholarly editions). It also includes the experimental development of design or construction solutions, as well as investigation that leads to new or substantially improved materials, devices, products or processes (PBRF definition).

* The term 'independent' here should not be construed to exclude collaborative work.

Research Grant

It is funding received for carrying out research from the university, extramural funding from research agencies, industry and other sources and to be used for the purposes for which it is granted.

JRDAC

Joint Research and Development Advisory Committee

RDC

Research and Development Committee

FLSBMS

Foundation for Life Sciences and Business Management Solan

SURF

The Shoolini University Research Fund is a part of the research investment made by the University.

4. Research Management

Policy and advice in research matters is coordinated through a number of bodies and committees:

- a. Joint Research and Development Advisory Committee (JRDAC), chaired by the Vice-Chancellor or an eminent scientist appointed by him. The Vice-Chancellor is Co-Chairman; in case the Chairman is appointed from outside the University. Other members of the committee are as follows:
 - i. President, Foundation of Life Sciences and Business Management.
 - ii. Registrar, All Deans and Heads of School (if in the rank of Professor).

- iii. All Professors
- iv. Five external Eminent Scientists/Engineers as appointed by the Vice-Chancellor.
- v. Vice-Chancellor may also nominate up to three faculty members other than Professors for one year as per the need.
- vi. Dean, Research and Development is the Member Secretary.

It advises Academic Council on research strategies to be pursued, develops policy (including strategic and scholarships policy for research students) and reviews progress in these areas (see Appendix A).

- b. Faculties and Schools are required to establish research and development committees (RDC) to support the research activities of their staff and postgraduate thesis students. Both committees are expected to comply with and oversee the implementation of university-wide research policies. Faculty research committees are chaired by the Dean Research and Development and has two external members (outside the university) from academia, one member from industry, all professors' /associate professors in the faculty, and two assistant professors (by rotation). A member secretary will be appointed from amongst the internal members. The RDC advises the JRDAC and their own faculties on research matters.
- c. The Research Office provides research services for staff and students. This support includes but is not limited to:
 - i. Assisting JRDAC with coordinating the activities of its subcommittees and monitoring external research policy developments
 - ii. Managing the Shoolini University Research Fund (SURF)
 - iii. Managing the internal administration of the Performance-Based Research Fund
 - iv. Securing and supporting external research funding from the public and private sectors
 - v. Monitoring and reporting on externally funded research grants
 - vi. Providing professional development opportunities for staff to enhance their research performance.
- d. Shoolini Life Sciences Ltd. is the University's commercial arm through which the management and commercialization of University Intellectual Property (see Intellectual Property Policy) are conducted.

5. Resources in Support of Research

- a. Shoolini University Research Fund (SURF)
 - i. The general principle governing the allocation of all research funding in the University is that it is an investment intended to maximize the range of outcomes that the University expects to result from staff and student research. The Allocations and Investment Subcommittee of the JRDAC allocates grants from this fund.

- ii. A portion of the SURF supports early career researchers and staff new to Shoolini University and is allocated by a subcommittee of the Allocations and Investment Subcommittee of the JRDAC.
- b. Faculty and School Research Grants
 - Faculties and Schools may allocate research funding according to their internal processes.
- c. External contracts/external research provisions and obligations
 - i. All applications for external research funding are to be submitted through the Research Office in the name of the Shoolini University.
 - ii. The Research Office provides the contract, financial and non-financial management services for the University's grant management process.
- d. Academic staff are expected to comply with the Management of External Research, Consultancy and Related Contracts Policy in the costing and pricing of external research and consultancy. They may also do research or consultancy under the Entitlement to Undertake Private Work Policy and are required to report such activity to their Head of School. Staff doing private work under the entitlement of this policy may manage their funds through the FLSBMS using the Guidelines for Independent Work in the FLSBMS.
- e. Academic staff are eligible to apply for leave in support of their research including Research and Study Leave, Overseas Conference Leave, Indian Conference Leave and Exchange Leave. Faculty committees recommend the award of such academic leave to their Faculty's Deans for approval.

6. Research Planning

Each Faculty and its constituent academic units is required to develop and implement its own research plan.

7. Evaluation and Monitoring of Performance

- a. The relevant Dean will monitor the performance of schools and research centers on the basis of agreed criteria and will advise the Dean (Research and Development) on the outcome of this process.
- b. The research performance of individual staff will be monitored and evaluated by their Head of School, Dean or VC/PVC as part of the staff Performance Development and Career Planning (PDCP) process.
- c. Staff will be required to participate in the external assessment of performance such as the Performance-Based Research Fund as directed by their Dean.
- d. Staff are required to supply full and accurate details of their research outputs (according to the output types and criteria in Appendix B) on an annual basis to their Head of School who will supply the information to the Research Office. The Research Office will publish an annual list of staff and student publications in the categories outlined in Appendix B.
- e.

8. Recruitment and Staff Development

- a. The appointment of new academic staff must give appropriate consideration to the quality of their research record or research potential commensurate with the requirements of the position. Responsibility for oversight of this rests with the relevant Dean.
- b. Academic staff are required as part of the annual PDCP process to prepare a research plan and to review that plan annually in consultation with their Head of School or Dean. Consultation should include a review of: research objectives, anticipated applications for external research funds, opportunities for collaboration, timelines and expected outputs. It should also reflect any special agreements reached regarding teaching, administration, research duties and research training and/or development opportunities for research according to the career stage of the staff member.
- c. Heads of School are required to consider workload issues in the distribution of supervisory responsibilities before approving enrolment proposals by postgraduate research students.
- d. Heads of School should ensure that newly appointed staff are familiar with research evaluations, research training and funding opportunities and the importance of publishing in suitable venues, both within the University and external to it.

9. Student Research

- a. Dean Academic Affairs, Deans and Heads of School are responsible for ensuring that the management of research degrees complies with the relevant University Statutes, policies and procedures.
- b. Deans are responsible for ensuring that faculties and schools make appropriate budgetary provision for the support of postgraduate student research.

10. Publication and Intellectual Property

- a. University expects that all research outputs will be publicly available.
- b. This expectation is subject to any considerations that justify either restricted publication or delayed publication, including the need to observe any contractual, confidentiality or privacy obligations entered into in respect of the research and resultant intellectual property, and the need to protect the value of potentially commercialisable intellectual property as required by the University's Intellectual Property Policy.
- c. In an effort to achieve the international standards, university mandates all publications from the research work conducted at Shoolini University should be published in SCOPUS or Thomson Reuter listed journals only. This would ensure that the quality of the research is of high standard and the publications would be

undergoing the stringent peer review process before coming into public domain. The research students from the university are also required to publish at least two research papers in order to be eligible to submit the research dissertation. The plagiarism policy of the University should be strictly adhered to and researchers are expected to follow the research ethics in spirit and word.

- d. Staff are required to comply with the University's Intellectual Property Policy.
- e. **PhD Research Thesis Evaluation:** University mandates that one of the examiners for the PhD thesis evaluation should be from outside India from a reputed Institute/university with significant expertise in the area of research presented in the thesis.
- f. **Patents:** University endeavors to protect the intellectual property generated by the researchers from the University and make efforts to take such discoveries are translated into useable products and technologies. To ensure the success of this endeavor University mandates recording all research done in the University in the University Lab Notebooks and proper maintenance of these records.

11. Research Centers and Institutes

- a. Characteristics of Research Centers and Institutes
 - i. The University establishes research centers to raise the research profile of the University, focus strengths in areas where there is (or the University wishes to develop) a concentration of research excellence, including areas of applied research, and to maximize external research funding. Research centers help position and promote the University's areas of research excellence and build the University's research reputation. They also serve as vehicles for engaging with other research institutions and industry and facilitate interdisciplinary and multidisciplinary relationships.
- b. Centers and Institutes are:
 - i. Consistent with the strategic interests of the University
 - ii. Central to the University's Research Strategy
 - iii. Aligned to the priorities of research funders and competitive with other bidders for that funding
 - iv. High quality
 - v. Substantial (in both finance and research)
- c. Institutes and centers are approved by Council. The title "center" or "institute" is only to be used after approval. Research groupings not so approved should use other general identifiers such as "project" or "unit".

12. Legislative Compliance

Though the University is required to manage its policy documentation within a legislative framework, there is no specific legislation directing this policy.

13. References

- a. Animal Ethics Policy
- b. Human Ethics Policy
- c. Intellectual Property Policy
- d. Plagiarism Policy
- e. Management of External Research, Consultancy and Related Contracts Policy

FUNDS FOR SPONSORED/ADHOC RESEARCH

The research driven model of the Shoolini University falls in line with public university wherein teaching, research and transfer of technology are integral part of the University system. The research priorities as spelt out in the ‘Research Policy’ document would require huge funding which may not be possible through the corpus raised by the sponsors. Both national and international resources are required to be tapped for this exigency and more so for biotechnology which is both time and capital intensive. The funds can flow either from national and international mode through competitive grant or by seeking out-source research from multinationals.

The success of fund generation through adhoc research projects rests on the quality of faculty to seek competitive grant. Shoolini University has, therefore, embarked upon a four tier faculty development programme – the first tier calls for hiring retired and experienced teachers or to attract serving Professors from public universities for guiding, collating and assistance in preparing research projects for second tier of post-docs and Indian Ph.Ds for adhoc grants. In this direction the University has already invested on a team of dozen distinguished teachers for the purpose. Such faculty will also promote the culture of high end research amongst the doctoral and master students.

The University has drawn a plan that in next twelve years, all teachers serving the university should possess Ph.D to become competent enough to seek independent research grant from DBT, DST, ICMR, ICAR, DRDO, DAE, etc. and all other research based ministries of the Govt of India.

PROGRAM FOR SOCIETAL BENEFITS

Farmers' Development

One of the objectives of the proposed University will be to address a wide range of problems of hill farmers in the field of agriculture, horticulture, medicinal and aromatic plants, forestry, animal husbandry and agro based industries, with a view to enhance their economic status. To fulfill this University will establish Directorate of Extension and Continuing Education as one of its important wings in the second phase. This Directorate will be involved in the following programs:

- a) Agriculture:** The program will be chalked out in such a fashion so that it helps the farmers to increase their productivity of the existing system in sustainable manner through resource management; to learn new ways to generate income through alternative enterprises, improved marketing strategies, management skills, plant protection, management, etc.
- b) Natural Resource Management:** Will teach farmers how to use natural resources optimally without degrading them and protect the environment with educational programs in water quality, water harvesting, agro forestry, waste management and recycling, organic farming, etc.
- c) Leadership:** in this program trainers will be trained under different programs so that they can help the govt. and the NGOs to implement various sponsored programs of their organization
- d) Youth Development:** This program will cultivate important life skills in youth that build character and assist them in making appropriate life and career choices.
- e) Family And Consumer Science** will help families become resilient and healthy by conducting awareness program in nutrition, food preparation skills child care, health care strategies, household and financial management.

f) Community and Economic Development: will help farmers and govt. to investigate and create viable options for economic and community development such as land use planning, small and medium size business development, tourism development, work force education, vocational training, etc.

Women Development

Women form half of the world's population and Indian constitution not only provides for equal rights and privileges of women and men but also to make special provisions for women's development. A series of social legislations have been enacted from time to time for raising the status of women in the country but no tangible improvement is seen towards women empowerment in rural India. The need of the hour is to provide broad based education to women in various fields which can help them in contributing towards improving the quality of their family life without disturbing their main role of household manager.

Therefore, the projected University proposes to start a School of Rural Development with a focus on women to cater the training and developmental needs of women. The emphasis will be on starting short and long term certificate courses and diplomas in the following fields:

- Fashion Designing
- Interior Decoration
- Food and Fruit Preservation
- Mushroom Cultivation
- Nursery Management
- Beekeeping
- Vegetable Seed Production and processing
- Computer Courses
- Catering Management
- Food and Herbal development
- Fishery Management

Industries

The proposed University shall have strong alliances with industries. Presently a large number of pharmaceutical, chemical based, automobile industries and other ancillaries are establishing their units in Himachal Pradesh. These shall require trained manpower in the field of biotechnology, management and chemical engineering, information technology, and business management, etc.

Shoolini University shall undertake the following activities for industrial linkages for employment generation and entrepreneurship development:

- to develop technical protocols in the frontier areas of biotechnology, pharmaceutical and food processing industries,
- to test and refine the technical protocols in collaboration with industries,
- to formulate the course curricula as per the industrial needs,
- to develop industrial linkages for internship to graduate and post-graduate students,
- to introduce such courses which are relevant to industrial requirements of Himachal Pradesh,
- to introduce short courses to graduates and post-graduates as per the industrial demand,
- to provide executive training to technical and administrative staff of the industries and
- to undertake joint research projects in collaboration with industries.

DETAILS OF BUILDING AND INFRASTRUCTURE FACILITIES

Building

Shoolini University had inherited 5000 sq m constructed area at the designated site of the University Campus at Bajhol, Solan, which was built by the Foundation for Life Sciences and Business Management for meeting the requirements of Pharmaceutical Sciences (B.Pharma), Business Management (MBA) and Basic Sciences (M.Sc. Botany and M.Sc. Chemistry), for the Shoolini Institute of Life Sciences and Business Management (affiliated to H.P. University). This was transferred to the University along with the aforesaid academic programmes run at the SILB. Shoolini University intends to construct another 50,000 sq m area in next six years to meet its objectives.

Infrastructure

All classrooms, labs, computer centre, library shall be furnished with facilities as per the International standards (**Exhibit V**). The infrastructural requirements of the university for the first phase are summarized below:-

Library

Shoolini University is keen to set up a library of international standard with well stocked books, periodicals, journals, magazines and scientific reports. Library shall be fully computerized for scanning of literature and articles recorded on CD and also for browsing on-line scientific journals. it is intended to invest rupees 3.5 crore ion the first phase of five years.

Equipments

Teaching and research labs of the University shall be fitted with modern gadgets providing excellent ambience for post-graduate and post-doctoral research. It shall be acquiring equipments worth rupees 7.75 crore in next three years. There shall also be provision of rupees 3.85 crore for recurring expenses.

Computer facilities

The computer facilities will embody a separate Computer Centre with Ethernet LAN network, with desired hardware and software and internet facility. In first three years the University shall house more than 200 computers so as to provide 7x24 hrs access for students. This facility in first years shall cost rupees 2.55 crore.

Furniture and Furnishing

All class rooms, labs, computer lab and other institutional area shall be furnished as per international standard. The estimated expenditure under this head shall be more than rupees 6.23 crore in five years.

Other movable, immovable assets and campus facilities

This shall include transport, road construction, water supply, electricity, sanitation, pantry, tractors, farm equipments, workshops and other ancillary needs. The total expenditure in first five years shall be about rupees 8.4 crores.

MASTER DEVELOPMENT PLAN, BUILDING CONSTRUCTION, INFRASTRUCTURE, AMENITIES, EQUIPMENTS, SOURCES OF FINANCE

It is envisioned to achieve the status of a World – Class University within first decade of its existence. It will have state-of-the-art laboratories, global connectivity, at least for each post-graduate student and faculty member on his / her desk.

(a) Campus Development Plan

The University, conforming to norms as prescribed by the UGC and other regulatory bodies, shall function like a corporate sector. Fifteen acres of land, acquired for the development of the Campus shall have a layout of a resort. The core of the campus will consist of laboratories, classrooms, lecture halls, hostels, library, administrative block, student centre, guesthouse and training centre, etc. The buildings would be designed on the principle of small private spaces (e.g. small offices with planned furniture) and large public places consisting not only of conference halls, committee rooms, common rooms, dining rooms, quadrangles and parks. Standard facilities for games and sports including a swimming pool and other cultural /recreational pursuits will be provided on the campus (**Exhibit VI**).

Details of constructed area for various teaching faculties and other facilities on the Campus are summarized below:

Faculty of Biotechnology and Applied Sciences

2200 sq m
(expandable to 4400 sq m)

Dean

Two Schools/Departments

Each School/Department shall have: one Professor, two Readers and four Lecturers

Number of lecture theatres	:	60 seated	4 nos.
		40 seated	2 nos.
Number of teaching labs	:	30 seated	6 nos.
Number of research labs	:	10 seated	4 nos.
Seminar hall			1
Faculty Office			1

School/department offices	4
Faculty store	1
Faculty of Basic Sciences	2200 sq m (expandable to 4400 sq m)
(Details as for Faculty of Biotechnology)	
Faculty of Engineering and Processing	2200 sq m (expandable to 4400 sq m)
Three Schools (other details as for Faculty of Biotechnology)	
Faculty of Pharmaceutical Sciences	2200 sq m (expandable to 4400 sq m)
(Details as for Faculty of Biotechnology)	
Faculty of Information Technology	2200 sq m (expandable to 4400 sq m)
(Details as for Faculty of Biotechnology)	
Faculty of Human and Animal Health	2200 sq m (expandable to 4400 sq m)
(Details as for Faculty of Biotechnology)	
Faculty of Management Sciences	2200 sq m (expandable to 4400 sq m)

Dean

Three Schools/Departments

Each school/Department shall have: one Professor, two Readers and four Lecturers

Number of lecture theatres	:	60 seated	4 nos.
		40 seated	2 nos.
Computer lab	:	30 seated	1
Committee/conference room			1
Seminar halls	:	60 seated	2
Seminar hall	:	200 seated	1
Faculty Office			1
School/department offices			4
Faculty store			1

Faculty of Socio-Legal Studies **2200 sq m**
 (Expandable to 4400 sq m)

(Details as per Faculty of Biotechnology)

Administrative Block **615 sq m**

Vice-Chancellor's Office (VC's chamber, confidential room, meeting room, reception lounge, supporting staff)	60 sq m
Pro Vice-Chancellor's Office (Pro VC's chamber, reception lounge, supporting staff)	40 sq m
Registrar's Office (Registrar's chamber, reception lounge, supporting staff)	60 sq m
Examination Branch	150 sq m
Finance Office (Finance Officer's chamber, reception lounge, supporting staff)	60 sq m
Director (Director's chamber, reception lounge, supporting staff)	40 sq m
Dean of University (Dean's chamber, reception lounge, supporting staff)	40 sq m
Information Center	50 sq m
Committee Room	50 sq m
Foundation for Life Sciences & Business Management (FLSBM) Wing	50 sq m
Security-Time Office	15 sq m
Guest House	450 sq m
Guest House (5 + 2 VIP Suites)	225 sq m
Officers Training Hostel (10 rooms)	

along with Mess-cum-canteen 225 sq m

Library and IT Center 6000 sq m

(Storage for books and periodicals, reading rooms, documentation/reprography, sorting, cataloguing, indexing, etc,)

Hostels 10000 sq m

Boys Hostels: (350 boys): 4000 sq m
Girls Hostels: (550 girls): 6000 sq m

Student facilities

Recreational Facilities/Student Facilities 2000 sq m

Auditorium	370 sq m
Student Center	180 sq m
Indoor swimming pool	460 sq m
Meditation Center	140 sq m
Gymnasium	70 sq m
Indoor Stadium for TT, Squash Courts, Badminton, Snooker etc	500 sq m
Training Seminar Hall (150 seating capacity)	140 sq m
Training Seminar Hall (100 seating capacity)	140 sq m

Others

4000 sq m

Primary Health Center	50 sq m
Shopping Complex	200 sq m
4 provision stores	(4×14 sq. m = 76 sq. m)
2 Banks	(2×45 sq. m = 90 sq. m)
1 Book/stationery shop along with Xerox-cum- STD facility	14 sq m
1 Laundry shop	10 sq m
1 Barber shop	10 sq m

Faculty Club 180 sq m

Dining Halls, kitchen stores, common rooms, Warden's quarters, hostel office, Hostel Superintendent/caretaker, kitchen and mess staff 3570 sq m

Open-air Theatre (For assembly of all students and staff, social and cultural functions)

Staff Residences

Internal communication/telephone exchange system

Field grounds for basketball/volleyball and cricket

Herbal/botanical garden/arboretum

Animal house
 Sewage treatment plant
 Water distribution reservoir
 Entrance Gate of the University
 Scooter / Car / Bus parking

(b) Campus Development Expenditure

The total investment on infrastructure is estimated at rupees 98.66 crores over a period of next five years. Out of the non-recurring budget, 72% will be invested on acquisition, development and building activities, about 14% shall meet research and software requirement, 3% for creation of campus facilities such as sports and student facilities, whereas 11% shall cover other expenses, including Biodiversity Park, vehicles etc. The security amount of rupees three crores has been deposited with the State Government. The following table summarizes the total requirement of built in area in the first phase of the University:

Total Projected Infrastructure Requirement						
	Year-wise sq m area					
	Zero*	I year	II year	III year	IV year	V year
		2008	2009	2010	2011	2012
Total Number of Students		477	954	1431	1824	2192
Total Number of Resident Students (Assuming 40% as residential)		191	381	573	730	877
Academic Area Required (sq m)		5483	10966.4	16461	20977	25213

Residential Area Required (sq m)		2180	4360	6544	8340	10024	10024
Annual Increment in Infrastructure (sq m)		7663	7663	7679	6311	5919	35236
Estimated Cost (per sq m)		7000	7000	9000	9000	11000	
Total Investment Involved		53641907	53641907	69112814	56803270	65112493.6	
Total Investment in Crores		5.36	5.36	6.91	5.68	6.51	29.83
Annual Academic Infrastructure Investments		383.8	383.8	494.5	406.4	465.9	
Annual Residential Infrastructure Investments		152.6	152.6	196.6	161.6	185.2	

*Inherited 5000 sq m constructed area to meet the requirement of existing B.Pharma, MBA, M.Sc. Botany and M.Sc. Chemistry

Note: The Foundation for Life Sciences & Business Management has already acquired assets of about rupees 12 crore for the functionality of SILB (5,000 sq m constructed area on lease; 24 acres of land and rupees 0.8 crore on equipments).

(c) Equipments for Biotechnological Research

Biotechnology is an equipment based research area, which is cost intensive in terms of finance, high skilled manpower and sophisticated instruments for carrying out routine students' training and hi-tech research. It also requires recurring cost of chemicals, glasswares/plasticwares, and other minor accessories and maintenance/repair of existing facility for the smooth functioning of labs. The institute also intends to undertake out-sourced R&D research and the bio-business entrepreneurship.

Equipments being the backbone of Research and Education of any World class Institute. Our endeavor is also to create this facility of international standard for attracting quality faculty and talented students. The details of equipments to be procured in a phased manner are given below:

**LIST OF EQUIPMENTS TO BE PURCHASED IN FIRST
TWO YEARS**

S. No.	Equipments	Unit
1	Milli-Q- Water purification system	1
2	ABI Prism 7000 Real time PCR Machine	2
3	Ice Flake Machine	1
4	Deep Freezer (-80°C)	2
5	Thermal Cycler	1
6	Transilluminator	2
7	Refrigerated Water Bath	2
8	UV-cross Linker	2
9	Hybridization Oven	2
10	Complete Isolation and Protein Electrophoresis System	2
11	Digital Balance	2
12	Ultra Sonicator	2
13	Phase Contrast Microscope with Photographic attachment	2
14	Insect Proof Poly House	4
15	Microtome	2
16	Plant Growth Chamber	2
17	ELISA Plate Incubator	1
18	ELISA Plate Reader	1
19	Fluorescence Microscope	1
20	DNASTAR Software	1
21	High Pressure Liquid Chromatography	2

**LIST OF EQUIPMENTS TO BE PURCHASED IN THIRD
AND FOURTH YEAR**

S. No.	Equipments	Unit
1	Milli-Q- Water purification system	1
2	Ice Flake Machine	1
3	Deep Freezer (-80°C)	1
4	Thermal Cycler	1
5	Refrigerated Water Bath	2
6	Hybridization Oven	2
7	Insect Proof Poly House	2
8	Plant Growth Chamber	2
9	ELISA Plate Incubator	1
10	ELISA Plate Reader	1
11	Fluorescence Microscope	1

	ABI Prism 3100 16 Capillary Automated DNA Sequencer	1
22	Automatic Karyotyping Workstation	1
23	Speedvac Concentrator	2
24	Orbitak Shaker	2
25	Fraction Collector	2
26	Automatic Slide Processor	1
27	DNA Synthesizer	1
28	Gas Chromatography	2
29	Class II Safety Cabinet	2
30	Ultraspec 2100 Prp UV-Vis Spectrophotometer	1
31	Lyophilizer	1
32	Ballistic Gun for Genetic Transformation	1
33	Flowcytometer with Sorting Facility	1
34	Fermenter for secondary metabolite production	1
35	Culture Racks with fluorescent tubes	2 sets
36	Air conditioner	6
37	Spectral Karyotyping System	1
38	Centralized UPS system	1
39	Laboratory Autoclave	2
40	Modi Zerox Machine	2
41	Gel doc system	2
42	Confocal Microscope	1
43	Protein Modeller	1
44	BOD Incubator	2
45	MALDI-TOF (Protein digester, sequencer, analyzer)	1

**LIST OF EQUIPMENTS TO BE PURCHASED IN
FIFTHYEAR**

S.	No.	Equipments	Unit
	1	β-scintillation Counter	1
	2	Micro Array Spotter	1
	3	Fermenter (10Lts)	1
	4	Computers (P-IV)	20
	5	Laser Printer/Color printer	2
	6	Liquid Nitrogen Plant (Small scale)	1
	7	Cold Room for Protein Purification and Culture Storage	2
	8	Laboratory Autoclave	2
	9	Ultra Centrifuge	2
	10	Exom V. 1.3- The advanced sequence analysis tool	1
	11	Hyperchem Professional	1

12	Laser gene 6 sequence Analysis Package	1
13	Sun Work Station & Bio-Cluster	1
14	Text Analyser	1
15	Image Analysis Software	1
16	Nuclear Magnetic Resonance	1
17	Fast Atom Bombarment Mass Spectrometry	1
18	Milli-Q- Water purification system	1
19	Ice Flake Machine	1
20	Centralized UPS System	1

The foundation believes that without seeking National and International research grants, it may not be possible to support the high quality research in biotechnology. We anticipate that faculty members shall be generating project grants to the tune of rupees 5 crore by the 5th year of the project. The fund generation through sponsored research is a standard model in both Indian and Global Universities, and private trusts.

ACADEMIC AUDITING

A three member committee shall be constituted to audit the academic performance of the faculty after every three years. A proforma will be developed for the evaluation of faculty. The performance of a teacher/scientist will be based on the following by adopting suitable scoring method.

- The highest weightage will be given to the evaluation of teachers by students.
- Performance of the students in the University examinations.
- Number of research/extension projects undertaken by a teacher/scientist and the grants received there upon. The number of research papers/reviews published and technology developed leading to the filing of the patent.
- Membership of Scientific Societies in India and abroad; number of Seminars, Symposia, Workshops and training programs attended during the last three years.
- Organization seminars, symposia and trainings for the benefit of teachers and students.
- Linkages with Industry and other teaching/research Institutes, private and government functionaries.
- Help rendered in placement of students after completing course requirements.
- Every teacher must score at least fifty percent marks in overall average.

DISTANCE EDUCATION

UGC Rules and Regulations, 2003 for Private Universities permit the establishment of off-campus and off-shore campuses under Distance Education Program only after five years of their establishment that too with its approval. The proposed University may consider setting up of off-campus/off shore campus only in the second phase as per UGC norms. Such units, if set up, shall have complimentary facilities for imparting Distance Education. Since the focus of the proposed University is on the mountainous regions, the Distance Education Program Centres, if started, shall be located in Indian Himalayan States and other countries located in the region.

GAMES, SPORTS AND EXTRACURRICULAR ACTIVITIES

Sports and extra-curricular activities are an integral part of educational system. A **Students' Activity Centre** will be set up in the proposed University catering to both indoor and outdoor sports and games besides cultural activities. The centre shall also house hobby clubs such as photography, adventure sports, literary-cum-dramatics etc.

The following facilities shall be created at the proposed site of the University.

- | | |
|--|-----|
| 1. Play ground for cricket /athletics & other outdoor field games | - 1 |
| 2. Play ground for: | |
| ▪ Volley ball court | - 1 |
| ▪ Tennis court | - 1 |
| ▪ Basket-ball | - 1 |
| ▪ Base-ball | - 1 |
| 3. Gymnasium | - 1 |
| 4. Multi-purpose Indoor Stadium to accommodate
badminton, table tennis, gymnastics, carom, chess, etc.
and cultural activities | - 1 |
| 5. Swimming-Pool | -1 |
| 6. Fast food cafeteria | - 1 |

FACULTY DESCRIPTION

The summary of subject matter contents to be taught by the eight Faculties in twenty Schools is given in the proceeding pages. This also includes the course contents of different sections included in each School.

Faculty of Biotechnology and Applied Sciences

Biotechnology is an interdisciplinary frontier between biology, engineering and medicine. With the completion of genomic project, the practice of medicine has undergone complete transformation. Even the discoveries in bacteria, yeast, or fruit fly can now be successfully translated into important therapeutic targets for drug discovery. DNA chip diagnostics, cell and gene therapy, and tissue engineering are also emerging as important biotechnology products. The Faculty of Biotechnology comprising Schools of i) Plant & Microbial Technology and ii) Molecular & Structural Biology will contribute to basic and applied research in plants and microbes. Emphasis shall be laid on gene isolation - transgenic, bio-prospecting - gene trading, vaccines & antibiotics - recombinant DNA drugs, and rapid mass propagation production of disease free planting materials.

School of Plant Microbial Technology

Genetic Engineering : Genetic engineering is an umbrella term, which can cover a wide range of ways of changing the genetic material, the DNA code in a living organism. This code contains all the information, stored in a long chain chemical molecule, which determines the nature of the organism - whether it is an amoeba, a pine tree, a robin, an octopus, a cow or a human being - and which characterizes the particular individual.

Course guidelines: Core techniques in gene manipulation are cutting and joining DNA, introduction of DNA into cells, cloning strategies, construction of genomic libraries and cDNA libraries, probe construction, recombinant selection and screening; analysis of expression, analysis

of recombinant DNA, sequencing, mutagenesis, altered expression and engineering genes; DNA amplification using polymerase chain reaction, analysis of amplified and ligase chain reaction. Expression systems and their applications, *E. coli*, *Streptomyces*, Yeast, *Baculovirus* and animal cells as cloning hosts, safety regulations for transgenic plants, genomic library and future prospects.

Enzymology: Enzyme classification and nomenclature, general properties of enzymes and effect of pH, temp, ions etc. Extraction , assay and purification of enzymes. Steady state kinetics. Michaelis – Menten, Lineweaver-Burke, Eadie-hofstee and Hanes-Woolf equations and Km value. Enzyme inhibitors. Pre-steady state kinetics. Fast kinetics to elucidate the intermediates and rate limiting steps (Flow and Relaxation methods). Enzyme specificity. Evidences for enzyme substrate complex. Role of metal ions in enzyme enzyme catalysis. Mechanism of enzyme action eg. Lysozyme, chymotrypsin, DNA polymerases, RNase, etc. Zymogens and enzyme activation. Allosteric interactions and product inhibition; Complex kinetics and analyses, Membrane bound enzymes, Enzyme Engineering

Immunology: History and scope of immunology. Types of immunity- innate, acquired, passive and active. Physiology of immune response- HI and CMI specificity and memory. Antigen- antibody reactions. Antigens-types-hapten. Immunoglobulins-structure, distribution and function. Molecular biology of Ig synthesis. Lymphoid tissues- ontogeny and physiology of immune system- origin and

development, differentiation of lymphocytes. Lymphocyte sub-populations of mouse and man. Structure and functions of class-I and II molecules. Antigen distribution in population-HLA in human health and disease. Transplantation immunity- organ transplantation and HLA tissue typing. Effector mechanisms in immunity- macrophage activation. Cell mediated cytotoxicity. Hypersensitivity reactions. Cellular interactions in human response. Antigen recognition. T, B-cell receptors.

Plant Tissue Culture: Introduction, plant cell & tissue culture technologies: a brief description, technology and potential application of organ and meristem culture, anther/pollen culture, callus,

suspension cultures and protoplast culture; plant propagation and somatic embryogenesis; plant regeneration through meristem, callus cultures and somatic embryogenesis, production, preservation and use of somatic embryos as propagules; artificial seeds and automation of somatic embryo production: principles, technology of automation and the application; embryo culture; haploid plant production; cryopreservation: storage of germplasm; protoplast culture; somatic hybridization etc., concept of commercialization and the need, design of a tissue culture laboratory and its management.

Biodiversity: Concepts and components of biodiversity; genetic, species and ecosystem diversity; biodiversity as an important resource; value of biodiversity, human population growth and implications for conservation and sustainable use of the biodiversity, earth summit and follow-up action; Conventions on biodiversity, Intellectual property rights of biodiversity and its products: patent protection and biopiracy. Measurement and estimation of plant diversity: inventorying and monitoring, phytogeographic distribution of important species, genera and families, biological islands; biodiversity hotspot in the world; domesticated and introduced species: diversity of domesticated, introduced and naturalized species, invasive species, impact of invasive alien species on the biodiversity, management of invasive species.

School of Molecular and Structural Biology

Molecular Biology: Basics of plant molecular biology; organization of nuclear genes: nucleus and chromatin organization, DNA packaging; organization and types of DNA sequences: functional and non functional sequences; chloroplast and mitochondrial genomes; molecular basis of DNA sequences as molecular markers and their applications; structure and expression of prokaryotic and eukaryotic genes: transcription and processing of RNA, regulatory signals in plant genes, RNA splicing, translation and post-translation processes, targeted proteins; techniques in molecular biology: techniques for isolation, identification, localization, and quantification of nucleic acids and proteins, detection of nucleic acids and proteins in solution, gel electrophoresis, visualization/detection of nucleic acids by fluorescence, blotting techniques, nucleic Acid hybridization, nucleic acid probes/antibodies for detection of proteins, auto-radiography and fluorography, *in situ* hybridization, *in vivo* labeling, other techniques and applications;

recombinant DNA techniques: restriction endonucleases and restriction mapping, DNA modifying enzymes, cloning vectors, scope of cloned genes, DNA sequencing, cDNA synthesis, construction of cDNA and Genomic libraries, PCR, Chromosome walking; Molecular Biotechnology.

Proteomics and Genomics: Genome overview, microbial genomes, DNA sequencing strategies, whole genome sequencing, genomic sequencing, shotgun approach, genome sequencing, sequence assembly (Phred/Phrap/Consed), gap filling, analysis of sequence data, analysis and annotation, gene finding in bacterial genomes databanks, sequence comparisons, protein structure, protein motifs and domains, evolutionary and computational genomics. Biochemical genomics: defining protein activities at the genome level chromatin structures and genome. Organization in bacteria, phylogenetic analysis – theory and application, micro array-based genomics: protein, functions at the genomic level.

Structural Biology: Techniques: CD/ORD, fluorescence spectroscopy, raman spectroscopy, electron microscopy, NMR, X-ray crystallography applications; understanding regulation and kinetics of biological activity, specific examples. Theory and applications of colorimeter, spectrophotometer, pH meter & buffers. Methods of protein estimation (Lowry and Bradford). Thin layer chromatography. Screening and identification of industrially important microorganisms. Production of an extracellular enzyme from bacteria/fungus and downstream processing: (a) Ultra filtration, (b) ammonium sulphate precipitation, (c) dialysis, (d) ion exchange chromatography, (d) gel permeation chromatography etc. Polyacrylamide gel electrophoresis, radioactive labeling a measurement of radioactivity. Demonstration of GLC and HPLC, introduction to the principles of biology, Introduction to spectroscopic methods - X Ray Crystallography and NMR, practice and applications of structural biology, geometrical and symmetrical system, Basic biochemistry and bimolecular structures, analysis of molecular structure function relationship, use of sequence analysis and molecular graphics computer programs.

Faculty of Basic Sciences

Basic sciences are the backbone of any knowledge intensive industry. Chemistry, biochemistry, microbiology, genetics, biophysics, bio-statistics etc. are the main disciplines in which industrial entrepreneurship develops, prospers and is sustained. The study of microorganisms leads to new possibilities in antibiotic production, fermentation technology, effluence treatment etc. The basic research in biochemistry shall not only help to harness the bio-molecules from rich biodiversity of the country but will also be an aid for bio-product development by understanding the chemistry of physiological processes of the living. Similarly the knowledge of biophysics shall help to employ DNA chip for the development of supercomputers – a combination of life and mechanics. This Faculty will help to develop a strong foundation of aforesaid contemporary basic sciences with all its manifestations and diverse facets relevant to agriculture, health and environment.

School of Physical and Mathematical Sciences

Physics as per UGC curriculum

Chemistry as per UGC curriculum

Mathematical & Statistics as per UGC curriculum

School of Bio-Sciences

Bio- Sciences (Botany and Zoology) as per UGC curriculum

Bio-Physics: Optics, lasers & fiber optics lasers, nature of light & matter, crystal structures, electricity & magnetism, quantum statistics, quantum mechanics, quantum fields, scattering theory, superconductivity, wave motion, electromagnetic waves, wave mechanics, force systems, equilibrium, friction, kinematics and kinetics of particles, properties of areas, concept of stress and strain, torsion, flexural loading, transformation of stress and strain, thermodynamics, complex analysis, green's functions, special functions, function spaces, orthogonal polynomials, fourier

analysis, lagrangian formulation of the free maxwell field, relativity, cosmology, maxwell's equations, non-linear dynamics, operators and operator algebra, perturbation theories, spectroscopy, nuclear properties, radioactivity, nuclear reactions, particle physics, cpt invariance, group theory, computational physics, semiconductor, electrodynamics, quantum mechanics, analog and digital electronics, band theory of solids, coordinate systems, non-linear dynamics, operators and operator algebra, perturbation theories, atomic spectra, electronic spectra, classical mechanics, statistical mechanics and newtonian mechanics.

Biochemistry: Chemical bonding, thermochemistry, reaction kinetics, catalysis, polymers, colloids, reactive intermediates, stereochemistry, $p\pi-d\pi$ bonding, tautomerism, alkanes, alkenes, alkynes, thermodynamics of chemical processes, kinetics of chemical reactions, bonding models in inorganic chemistry, fundamentals of various spectroscopic techniques, coordination chemistry, organic reaction mechanism, stereochemistry of carbon compounds, principles of organic synthesis, instrumental methods of chemical analysis, quantum chemistry, radioactivity, environmental study, chemical equilibrium, periodic table, solutions, group theory, inorganic spectroscopy, inorganic chains & cages, isomerism, structure and functions of biomolecules. Carbohydrates, amino acids, proteins, DNA, enzymes & their applications. Chromatography, organic and inorganic polymers. Separation methods of proteins & amino acids (electrophoresis, ultracentrifugation, ion exchange, edeman degradation, chromatographic separations, etc. lipid chemistry. lipid classification, nomenclature and properties. Biochemistry of cell, vitamin, introduction and an overview of metabolism, hormone mechanisms.

Microbiology: Microorganisms and safety: harmless microorganisms and assumptions, gilsp and gosh practices in industry, handling of clinical samples, spills and contaminated items, aerosols, assessing autoclave function, sterilization with radiation, biosafety cabinets. Ultra centrifuges, bio-safety and containment for risk type microorganisms: risk categories for different value systems, laboratory types for different bio-safety/containment levels and equipment. Physical and biological containment, handling of genetically manipulated microorganisms and plant pathogens, disposal and decontamination. Environmental applications: wastewater microbial treatments, composting and solid waste treatment, biogas, sludge from fermentation as fertilizer, live microbial cultures for fertility increase, bio-formulations, eutrophication control, bio-deterioration control,

biomining and geological applications. Microorganisms and agri-production: microbial inocula, biopesticides, dinitrogen fixation, introduction to organic agriculture, organic matter as food for soil microorganisms, virus detection, bacteria and virus elimination in tissue cultured plants, soil biological quality and crop growth: soil components, soil organic matter and humus, mineralization and immobilization, priming effect, rhizosphere and phyllosphere, plant-microbe interactions, symbiotic associations, soil fertility and soil degradation. Food technology and microbial aspects: microbial food spoilage and improvement, preservation and storage, aflatoxins, sanitation in food industry, value addition, testing of food for microbial pathogens, food related microbial pathogens. Microorganisms in industry: industrial hygiene, yeast technology, microbial biomass as food, milk products, alcoholic beverages, production of rhizobial inocula, use of gm microrganisms in industry.

Genetics: Introduction, mendelian genetics, genes and chromosomes, mapping of eukaryotic genes, the genetic material, mutation, the eukaryotic chromosome, prokaryotic genetics, molecular genetics—techniques, gene regulation, developmental genetics, population genetics, genetic maps, physical maps, sequencing, genetic organisation, population genetics

Faculty of Engineering and Processing

The science of Engineering offers exciting opportunities for transforming technologies in to business propositions. Chemical engineering has contributed significantly to the development of the Bio-products. DNA chip diagnostics, cell and gene therapy, and tissue engineering are new facets of engineering at cellular level. The Faculty of Engineering and Processing shall have three different schools: i) School of Engineering, ii) School of Nanotechnology and iii) School of Food Processing and Nutraceuticals.

Chemical Engineering: Mathematical and engineering mechanics, basic mechanical systems, engineering, graphics, engineering physics, engineering chemistry, engineering drawing, basic civil engineering, English & communication skills, electro-techniques, comp fundamentals & programming, workshop practice.

Mechanical Engineering: Mathematical methods, chemistry, statistics, basic data processing, discrete mathematics and linear algebra, physics/fluid mechanics, accounting and business administration, management, marketing organization, statistics and strength of materials, engineering drawing/CAD 1, technical thermodynamics, Cad 2 calculation, material science, dynamics, control, modeling and analysis, machine elements, manufacturing and quality assurance, design and product development, thermal energy production and engines, HVAC and refrigeration, fluid power and centrifugal pumps, natural gas technology, CAM, applied science, practical training, system design and simulation.

Electronic Communication: Introduction, modulation, E.M. spectrum, B.W., transmission modes, signal analysis, mixing, noise analysis, filters (handout), harmonic composition of a Square wave, PLL, frequency synthesizer, wien-bridge oscillator, principles (envelope, spectrum, phaser modulation index, distortion, power), AM circuits (low level, med power), AM transmitter (low level, high level), trapezoidal pattern, amplitude modulation, receiver parameters (selectivity, bandwidth, sensitivity), types of A.M. receivers (tuned method, superhetrodyne), A.M. receiver ckt's analysis (RF.amp, local oscillator, demodulator, I.F. amplifier, detector, AGC, squelch circuits), tuned amplifier, envelope detector, SSB systems(SSBFC,SSBSC),mathematical representation, SSB generation(ring modulator, push-pull modulator, bridge modulator), SSB transmitter (filter method, phase shift method), SSB receiver(coherent and non-coherent BFO methods).

Bioinstrumentation: Introduction, review of bioinstrumentation, biological elements, immobilization of biological components, transducers – electrochemistry, transducers-optical methods, transducers– other methods, bioinstrumentation, electronic noses, medical instrumentation, project presentation, biosensor performance factors, biosensor applications, applied math, science, engineering, design, conduct experiments, analyze, and interpret data, design system component, process to meet desired needs, function on multidisciplinary teams, identify, formulate and solve engineering problems, understand professional and ethical problems, understand the impact of engineering on society and the world, recognize need for and engage in

life-long learning, know contemporary issues, use modern techniques, skills, and tools for engineering practice.

School of Nanotechnology

Nanotechnology: Basic biology and biochemistry with emphasis on the nanobiology of the cell, chemistry of biological molecules, genes, gene technology, membranes, immunology, neurobiology, natural and artificial nanostructures (macromolecules: proteins, DNA, polymers, micelles etc.), introduction to nanoscale characterization methods such as scanning probe microscopy, electron microscopy, X ray diffraction, etc., introduction to nanolithography, introduction to nanoscale characterization methods such as scanning probe microscopy, electron microscopy, X ray diffraction, etc., the electronic, optical, magnetic and chemical features of nanostructures, "Top down" production of nanostructures, e.g., through molecular beam epitaxy.

Cybernetics: The term 'cyborg', or cybernetic organism, refers to the blending of technology and humanity. We already depend on technology such as glasses, hearing aids, pacemakers, false teeth etc and therefore many of us are already, to a certain extent, 'cyborgs' - part human, part machine. Electronic engineering and cybernetics, applied artificial intelligence and cybernetics, applied computer science and cybernetics, B biomedical engineering and cybernetics, computer science, control engineering & cybernetics, robotics, systems engineering.

School of Food Processing and Nutraceuticals

Food Processing: Food science is a multi-disciplinary science, which applies chemistry, microbiology, engineering, nutrition, and other basic sciences to solve problems related to the production, preservation, processing, distribution and utilization of food. Principles, technologies, and applications involved in conversion of raw products into high quality foods, processing principles such as thermal processing, irradiation, freezing, membrane concentration, enzyme technologies, dehydration and refrigeration.

Nutraceuticals: Nutraceutical refers to a food or part of a food that allegedly provides medicinal or health benefits, including the prevention and treatment of disease. Introduction general info,

history, concepts, key terminology, definitions, pharmacology, metabolism, vitamins, food terminology, glossary of food, list of common herbs, short list of selected herbs, clinical data, foods, functional recognized foods, market general, international regulatory environment ONHP.

Faculty of Pharmaceutical Sciences

The Indian pharmaceutical industry is the single largest and dynamic component of biotech industries. Meaningful under-graduate and postgraduate programs in pharmaceutical sciences are markedly influenced by bioinformatics, drug designing, biotechnology, bio-processing, and recombinant DNA drug related information. The pharma industry in future shall require trained pharma graduates with specialized skills. Through this faculty, the university intends to produce a new brand of pharma graduates. The Faculty with its three Schools namely, i) Pharmacology, ii) Pharmacognosy, and iii) Pharmaceuticals shall provide excellent opportunity in pharma research and teaching.

Pharmaceutical Sciences

School of Pharmacology

Phytochemistry: Natural Products, chemistry, isolation, characterization and estimation of phytopharmaceuticals belonging to the group of alkaloids, glycosides, terpenoids, steroids, bioflavanoids, purines, lipids. pharmacognosy of crude drugs, classification and nomenclature of important medicinal plants, general principles underlying capillary GC, introduction to applications of IR, UV, and NMR spectroscopy, mass spectrometry and GC/LC/MS to the characterisation and quantitation of extracts from medicinal herbs, Study of alkaloids, terpenoids and phenylpropane derivatives, amino acids and peptides. Carbohydrates; monosaccharides, disaccharides, oligosaccharides, polysaccharides, starch, hemicelluloses, cellulose, glycosides, lignin, flowering plant proteins; purines and pyrimidines and their derivatives, an introduction to selected volatile plant components (e.g. mono- and sesquiterpenoids). Study of the important biodegradative pathways that influence the post-harvest availability and efficacy of herbal

medicines, consideration of timing of harvest and post-harvest treatment of herbal medicinal products. Plant constituents as lead compounds in drug discovery; important antimalarial, antitumor, and antiretroviral agents from herbal origin

Pharmacology: Components of foods or dietary supplements that have medicinal or therapeutic effects, general pharmacological principles including toxicology, drug interaction, pharmacology of drugs acting on central nervous system, cardiovascular system, autonomic nervous system, gastro intestinal system and respiratory system, pharmacology of autacoids, hormones, chemotherapeutic agents including anticancer drugs, bioassays, immuno pharmacology, drug-receptor theory, agonist and antagonist dose-response curves, receptor isolation and characterisation, receptor regulation, electrical and biochemical aspects of drug-receptor interactions, neuropharmacology, cotransmission, cell culture, molecular genetics, clinical trial design, graphical methods, exploratory data analysis, probability distributions, hypothesis testing, confidence intervals, non-parametric methods, correlation, regression, analysis of variance, analysis of serial measurements, volume of distribution, single and multiple intravenous and oral doses, non-linear pharmacokinetics, therapeutic drug monitoring, pharmacokinetics in disease states, population pharmacokinetics and Bayesian methods, assessment of bioequivalence, regulatory issues and the principles underlying generic substitution, Phase I and II metabolism, factors affecting metabolic activity, genetics and drug metabolism, radiolabelled drug metabolism studies, toxicity, intravenous and oral pharmacokinetics, pharmacokinetic modelling, metabolite pharmacokinetics, statistical moments, concentration-effect modelling, nonlinear regression analysis.

Toxicology: Principles in toxicology, animal management in toxicological evaluation, animal toxicity tests, statistical concepts of LD₅₀, dose-effect and dose response relationship, frequency response and cumulative response, biological and chemical factors that influence toxicity, biotransformation and bio-accumulation, influence of ecological factors on the effects of toxicity, pollution of the ecosphere by industries, global dispersion of toxic substance, aquatic toxicity tests, statistical tests, response of planktons to toxicants, EC₅₀, photosynthetic bacteria, bio-absorption of heavy metals, information management system in eco-toxicology, pollutants vs. resources, cycling of materials, tolerance ranges, carrying capacity, bioaccumulation, pharmacology, basic

principle of environmental health, Physiological responses of man to relevant stresses in the environment. Cases and effects of pollution. Industrial Toxicology: Study of environmental dose effect relationships. Evaluation of toxicity and threshold limits. Principles and methods of occupational health.

School of Pharmacognosy

Herbal Drugs: Plant genetic diversity, molecular taxonomy, species and population biodiversity, maintenance and conservation of plant genetic resources, assessing, analyzing and documenting biodiversity, drug literature and publications, structure of the cell as a unit, standardisation of raw materials and herbal products, plant analysis, phytochemistry and pharmaceutical uses of various plants, lipids, carbohydrate and related compounds, alkaloids, plants in complementary and traditional system of medicine, population biology, community ecology, taxonomy, bio-active molecules, leads and drugs from herbs, herbarium preparation and maintenance, monographs preparation, classification and nomenclature of important medicinal plants, general principles underlying capillary GC, introduction to applications of IR, UV, and NMR spectroscopy, mass spectrometry and GC/LC/MS to the characterisation and quantitation of extracts from medicinal herbs, conservation, maintenance and propagation of germplasm of medicinal and economic plants, Triple ‘P’ based standardization of herbal drugs marker compounds generation , marker compound based quality evaluation of herbal drugs development of natural product based new chemical entities.

Natural Products/Resources: Natural Products and their classification, extraction, isolation and purification of natural products, characterisation and structural elucidation of natural products, study of alkaloids, terpenoids and phenylpropane derivatives, amino acids and peptides, carbohydrates, monosaccharides, disaccharides, oligosaccharides, polysaccharides, starch, hemicelluloses, cellulose, glycosides, lignin, flowering plant proteins, purines and pyrimidines and their derivatives, introduction to selected volatile plant components, techniques for extraction and Isolation of natural products, chromatographic and spectroscopic techniques like TLC, GC, HPLC and HPTLC, UV-VIS, Mass, NMR, study of the important biodegradative pathways that influence

the post-harvest availability and efficacy of herbal medicines, timing of harvest and post-harvest treatment of herbal medicinal products, structure, nomenclature, classification, synthesis, and metabolism of drugs e.g. hypnotics and sedatives, analgesics, NSAIDS, neuroleptics, antidepressants, anxiolytics, anticonvulsants, antihistaminics, local anaesthetics, cardio vascular drugs etc. - chemotherapeutic agents - antibiotics, antibacterials, sulphadrugs etc.

School of Pharmaceuticals

Drug Processing: Natural products, isolation, characterization and estimation of phytopharmaceuticals belonging to the group of alkaloids, glycosides, terpenoids, steroids, bioflavanoids, purines, guggul lipids, techniques for extraction and Isolation of natural products, chromatographic and spectroscopic techniques like TLC, GC, HPLC and HPTLC, UV-VIS, Mass, NMR, pharmaceutical processing, unit processes, formulation of sterile products, principles of formulation, biopharmaceutics, pharmacokinetics and pharmacodynamics, formulation of biotechnology products, regulatory affairs and manufacturing specifications.

Drug Prospecting: Historical and geographical causes for diversity, ethno botany, classification and nomenclature of important medicinal plants, genetic diversity, molecular taxonomy, species and population biodiversity, quantifying biodiversity, high throughput screening, maintenance of ecological biodiversity, conservation of plant genetic resources assessing, analyzing and documenting biodiversity, morphological and molecular characterization of biodiversity, vulnerability and extinction of biodiversity, community ecology, tissue culture techniques.

Faculty of Information Technology

Bioinformatics is an amalgamation of biology and information technology. It calls for multidisciplinary expertise for the development of genomics that demand high level of knowledge of fundamental biology, genetics, molecular biology, statistics, computer science, and mathematics instead of a loose mix of all these fields. A separate Faculty of Bioinformatics and

Information Technology shall provide a strong analytical base to reduce the time involved in the discovery life cycle. This Faculty will have two Schools namely, i) Bioinformatics and ii) Information Technology for conducting research and imparting education in these disciplines with logical support from other bio-based faculties.

School of Bioinformatics

Drug Designing: Introduction to computers/programming languages- Perl, C, RDBMS concepts Internet/www in bioinformatics, introduction to various drug designing software, mathematics and statistics for bioinformatics, cell biology, basic biochemistry and biomolecular structures, pharmacophore generation, medical informatics.

Gene Sequencing: Gene sequencing is the process of recording the exact sequence of nucleotides in the section of an organism's DNA corresponding to a specific gene. Introduction to computers/programming languages- Perl, C, RDBMS concepts, Internet/www in bioinformatics, Introduction to various drug designing software, Mathematics and statistics for bioinformatics, molecular biology, basic biochemistry and biomolecular structures, methods for sequence analysis, computational methods for gene structure prediction.

School of Information Technology

Computer Languages : ActiveX, APL, AppleScript, Assembly, BASIC, C, C++, C#, COBOL, Delphi, DHTML, Fortran, HTML, Java, JavaScript, JCL, Logo, ORACLE, Perl, Parallel Languages@, Pascal, PL/I, PostScript, Prolog, Python, Ruby, SAS, Scheme, Script Ease, Scripting Languages, Smalltalk, SQL, Virtual Reality Modeling Language (VRML)@, Visual, Visual Basic, Visual FoxPro, VHDL, XML, .NET.

Computer Application: Computing Management and Solutions, Networking, Communication Technology, Web site Management, Data Analysis & Database Design, Multimedia and Internet Development, System Analysis and Design, Relational Database Management Systems, Internet Technologies, Information System Security, Computer Fundamentals and PC Software, PC

Software Application Skills, ‘C’ Programming and Data Structure, Introduction to System Software, Introduction to Computer Organization, Windows Programming, Natural Language Processing, TCP/IP Programming, Internet Technologies, Parallel Processing, Artificial Intelligence, Simulation, Computer Graphics, Operational Research, Discrete Mathematical Structures, Introduction to Microprocessor, Foundation Course in Science and Technology, Compiler Construction, E-Technologies, Object Oriented Programming concepts.

Software and Hardware Development: Software Development: Board support package development, graphical user interface design and development, porting of existing applications, development of new custom applications, control panel applet development, development of production factory test software; Hardware development: developing a new embedded system, mobile or wireless product, design of high performance 32-bit processor systems, low power and battery powered designs, LCD applications and full custom design, in-house PCB design, layout, prototyping and manufacture, leading windows CE certified processor cores including X Scale, strong ARM, ARM9, SH4, MIPS, and x86, EMC performance designs, FCC and UL approvals, including RFI emissions, RFI immunity, safety testing and telecom approvals.

Faculty of Human and Animal Health

Human Genome Project has opened new vistas in better management of human and animal health. Possibilities of replacing vaccines and antibiotics with recombinant drugs and gene therapy are tremendous. Embryo rescue technique is fast emerging as an important technology for attempting desired mating. The Faculty will have two Schools namely, i) Medical Biotechnology and ii) Animal Biotechnology for strengthening research and teaching in these areas.

School of Medical Biotechnology

Diagnostic Kits: Rapid diagnostic kits for fertility, drugs of abuse, turnor markers, cardiac marker, glucose monitoring system, immunometrics diagnostic, ELISA diagnostic and IFA diagnostic kits.

Molecular marker kits for rapid identification of disease causing pathogens to diagnose several diseases quickly and easily. Diagnosis test kits for screening and mean blood/plasma glucose levels, diabetes, microalbumin test kits, predictive cost saving modeling.

Gene Therapy: Regenerative medicine, genes and proteins (antibodies, growth factors, hormones), cells and tissues, embryonic stem cells and biomaterials, protein-based drugs and therapies containing human cells, tissue engineering, tissue engineering technologies including matrices and scaffolds, in vitro and in vivo technologies and novel materials including those utilizing nanotechnology of inorganic substances, bone and cartilage grafting and regenerative products derived from autologous, allogeneic and xenogeneic sources, demineralized bone matrix products, products containing morphogenic proteins and bone growth stimulators.

Human Genetics: Introduction to classical genetics, change and structure of genetic material, function of genetic material, introduction to developmental genetics, gene regulation during embryonic development, introduction and historical perspective of endocrinology, relevance of the study of endocrinology in the context of human and animal health care, molecular mechanism of hormone action, physiology and molecular biology of the hypothalamo-hypophyseal-gonadal axis: (GnRH, FSH, LH, progesterone, testosterone and estradiol), and genetics of its diseases, insulin, growth hormone, chemistry, physiology, molecular biology and commercial production.

School of Animal Biotechnology

Cloning and Embryo Rescue: Introduction to animal reproductive biotechnology, developments, importance and need, physiology and molecular biology of spermatogenesis, sperm maturation, sperm capacitation, folliculogenesis, ovulation and fertilization and their diseases, assisted reproductive technology (ART), in vitro fertilization-retrieval of gametes, in vivo maturation of ovum, intracytoplasmic sperm injection, production of viable blastocysts, embryo transfer, cryopreservation of gametes and embryo, cloning and transgenic animals, use of gene technologies in animal breeding.

Transgenic: Studies in mammalian biology with options in reproductive and developmental biology, immunology and infectious diseases, and mammalian toxicology, genetic engineering in animals, transformation of animal cells, cloning vectors and expression vectors, animal viral vectors and yeast vectors, vaccines and hormones, production of useful proteins in transgenic animals, AIDS oncogenes and anti-oncogenes – phage display technology, signal transduction, baculoviruses in biocontrol and foreign gene expression, biotechnology of aquaculture, ethical issues in animal biotechnology.

Dairy Microorganisms: Bioreactor design and operation, media composition, rheology, gas exchange and mass transfer, sterilization, bioreactor scale-up, process engineering and instrumentation, production and commercial applications of industrial products, downstream processing and product purification, microbial diversity; cell structure; life cycles, classification of microbes, growth habits, biochemical assays of microbes.

Faculty of Management Sciences

Biotech based industries are expected to add new dimensions to the socio-economic fabric of the country in the near future. The economic survival and development of bio-based industries therefore hinges on the management systems. Besides, this globalization has opened new vistas in the field of bio-based product exports and hence the need for the specialized manpower in international marketing and finance, production management, logistics etc. The bio-based industries require personal with proper perception of the principles of management and biotechnology. The Faculty with two Schools, i) Management and Entrepreneurship Development, and ii) International Business iii) Business Economics aims to develop entrepreneurs/managers having the qualities of integrity, ethics and compassion for the bio-business.

School of Management Sciences

Financial Management: Mergers and Acquisitions, Derivatives and Risk Management, Corporate Tax Planning, Managing Financial Markets, Security Analysis and Portfolio Management, Capital Markets & Investment Banking, International Finance, Financial Reporting & Analysis, Management Control Systems, Strategic Financial Management, Equity Research

Marketing Management: Brand Management & Rural Marketing, Sales & Distribution, Research methods in Marketing, Product Policy & Product Management, Business to Business Marketing, Marketing of Technology Products, Advertising Strategic & Sales Promotion, Services Marketing & Management, International Marketing Channels, Consumer Behaviour, Retailing & Merchandising

Human Resource Development: Management of Excellence, Managing Negotiations, Cross Cultural Management, Industrial Relations, Organization Structure & Design, TQM in HR, Corporate Compensation Strategies, Organizational Development, Strategic HR, Training & Development.

Entrepreneurship Development and Family Business: Entrepreneurship & New Venture formation, Strategic Advantages of IT, Entrepreneurial Finance, Doing Business In India, Business Laws for Entrepreneurs, Entrepreneurship & Innovation, Venture Capital & Private Equity Investing, Family Enterprises: Issues and Solutions

School of International Business

International Trade: Managing Technology & Capital Transfers, Managing People across Cultures, Decision Making in a Global Environment, International Marketing, Managing International Trade & Investment, International Finance, International Economics & Trade Policy, International Accounting, International Business Negotiation & Dispute Settlement.

International Finance: International Financial Markets, International Finance, International Risk Management, The Economics of Global Financial Markets, International Financial Reporting. Analysis of Financial Statements, International Aspects of Business Law, Modern Portfolio Management, International Financial Services.

International Human resource Management: Human Resource Management, Cross Cultural Management, Employee Relations in an International Context, Global Business Strategy, International HRM, Strategic HRM, Managing HR Information, Managing HR for Competitive Advantage, Understanding managerial work.

School of Business Economics

Bio-business Management: Bio-business information system, Decision-making support information, Environmental resource Database, Data processing for bio production, Livestock farm management, International Regional agriculture, International Regional ecology, Global environmental conservation, International biological environment, Business law, International agricultural education.

Business Economics: Managerial Economics, The Economic Environment of Business Macroeconomics), Global Managerial Perspectives International Business in the World Economy, Multinational Enterprises, Competitiveness and Public Policy, International Taxation and Business Practice, Business and the Regulatory Environment, The Economic Environment of International Business, Forecasting Models and Econometric Methods.

Transport Economics: Applied Statistics and queues, Transport Economics and Modeling, Economic Impact Assessment, International Shipping, Industrial Organization, Mathematical Modeling in Logistics, Management of Logistic Processes, Vehicle Routing and Forecasting.

Faculty of Socio-Legal Studies

The development of bio-materials by altering genome of living organisms shall call for numerous social and legal issues. IPR rights along with patenting of technology shall be the key issues of tomorrow. Furthermore, the Science of biotechnology which is multidisciplinary nature would need the legal opinions for harnessing its optimal gains. The Faculty will have two Schools namely, i) School of Sociology ii) School of Legal Studies for strengthening teaching and research in these areas.

APPOINTMENT OF EMPLOYEES IN THE UNIVERSITY

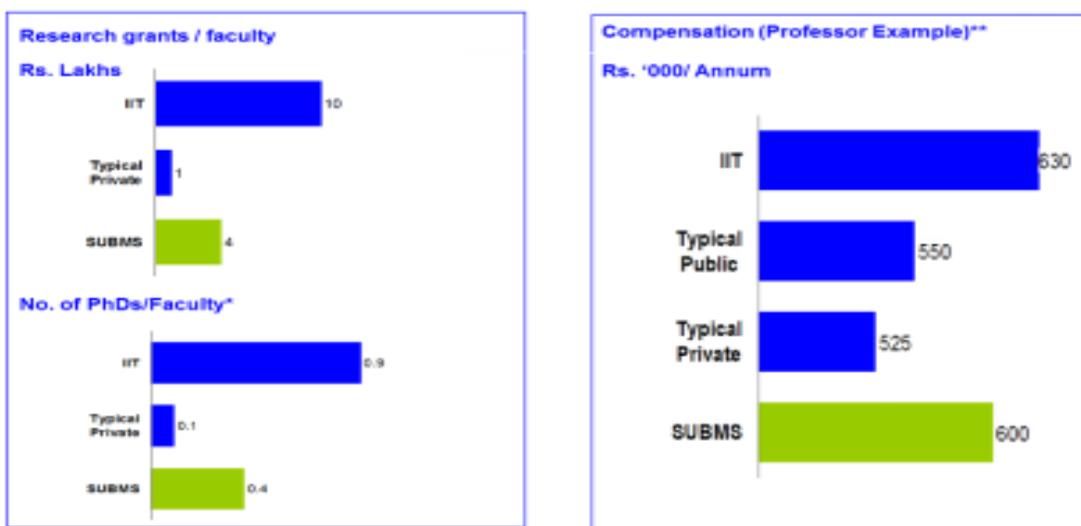
There shall be three categories of employees in the University.

- i. Statutory Officers (Registrar, Comptroller, Directors, Deans)
- ii. Teachers
- iii. Administrative officers
- iv. Employees of the University

All appointments in the University shall be made on the recommendation of a Selection Committee constituted for the purpose. For categories (i), (ii) & (iii), Vice-Chancellor shall be the Chairman of the Selection Committees and their appointments shall be approved by the Governing Body/Board of Management. While for category (iv), the Selection Committee shall be chaired by the Registrar of the University or any other nominee of the Vice-Chancellor and their appointments shall be approved by the Vice-Chancellor.

The qualifications and scales of categories (i), (ii) & (iii) shall be at par with UGC. In case of teachers (including Dean and Director), their salary shall ordinarily be higher than those proposed by UGC. Viewing that the reputation of the University implicitly depends on the quality of its teaching faculty we shall attract outstanding persons to join the faculty, by offering them attractive compensation/packages, upwards of the UGC norms, by producing consultancy avenues and challenging work environment (**Exhibit VII**). SUBMS envisages to follow the research driven model for which the appointment procedures of teachers shall not only be rigorous but preference will be given to those who have experience in generating research grant from national and international donors. Teachers shall also be paid honoraria in lieu of such efforts, which shall not ordinarily be less than rupees 2000 pm out of the project fund. Post-doctoral/industrial/management experience shall be the essential qualification for the appointment of Readers/Associate Professors and Professors. In case of other employees of the University, the pay scales, qualifications and the procedure of selections shall be defined in the Ordinances, which by and large shall match with HP Govt.

SUBMS value proposition to attract faculty will be its focus on research and competitive pay scales



*All benchmark compensation numbers Adjusted for inflation of 7%

Exhibit VII