Somaiya Vidyavihar University

Admission Manual

Ph.D. Programme

July 2023

Visit for Further Details: https://www.somaiya.edu/en/phd/

Somaiya Vidyavihar University

INDEX

About Somaiya Vidyavihar University

On 26th August 2019, Somaiya Vidyavihar University become a reality !

We made this milestone after six decades of creating holistic teaching learning experience educational institutes of great repute. Somaiya Vidyavihar University has become a self finance – the first private University in Mumbai vide the Maharashtra Self-Financed Universities (Establishment and Regulation) Act 2013.

We have a dream to build and support a world-class institution, one that is proudly Indian, and excels in education, research and service. Somaiya Vidyavihar University will be a place where knowledge is preserved, disseminated, and new knowledge is created. It will be global in the reach of its ideas and universal in its service. Somaiya Vidyavihar University is a place where students and faculty can explore " Freedom of Possibilities" , pursue your passion and above all, find yourself.

Our History and Vision
An all-round education must integrate Indian culture, values & morality into the curriculum.

The Somaiya Vidyavihar Complex was founded in 1959 by late Shri K.J. Somaiya (1902-1999). Endowed with a sharp business acumen, a balanced perspective and a social bent of mind, Karamshibhai set up the Somaiya Trust in 1953 for furthering his dream of shaping young minds through quality education. For this purpose, he bought a large area of land at Ghatkopar, then considered to be distant, meagrely populated.

In six decades it has grown into a large educational complex with 34 institutions catering to diverse fields of education such as Humanities, Engineering, Education, Medicine, Management, Dharma Studies ,Pure Sciences and Commerce & Business Studies, with more than 39000+ Candidates and 3000+ Faculties and staff on a throbbing 50 acre campus.

Our Founder, Padmabhushan Shri K. J. Somaiya founded Somaiya Vidyavihar on 9th September 1959. He later founded the Girivanvasi Pragati Mandal, The K J Somaiya Medical Trust, Girivanvasi Education Trust and sister institutions to make great citizens of India and the World. In the words of Swami Vivekananda, "We want that education by which character is formed, strength of mind is increased, and the intellect expanded, and by which one can stand on one's own feet." We have now grown into a multi-disciplinary and multi-campus education institution with over 1500 faculty, and 38, 000 candidates.

With PhD programmes in various faculties , we provide innovative platform for research aspirants to make a niche of their own to impact society and life.

I. Eligibility criteria for PhD Admission
Subject to the conditions stipulated in the SVU Ph.D. Regulations,the following candidate are eligible to seek admission to the Ph.D. Programme

	1. Education Qualification
i.	Master's degree (2 year or 1 year) or a professional degree declared equivalent to the Master's degree by the corresponding statutory regulatory body, **with at least 55% marks** in **aggregate** or **its equivalent as per UGC regulations.**
ii.	Candidate **seeking admission after** a **4-year/8-semester bachelor's degree programme** (B.Tech / B.E, B.Pharma, MBBS or BDS or BAMS or BHMS or B.Sc (Honors) or Pharma.D / Pharma.D. (Post Baccalaureate) **should have** a **minimum of 75% marks in aggregate** or **its equivalent as per UGC regulations**
iii.	A person whose Master's dissertation has been evaluated and the viva-voce is pending may be admitted to the Ph.D. Programme but subject to completion of Master's degree before provisional admission to SVU Ph.D. Programmes.
iv.	Candidates possessing a Degree considered equivalent to Master's Degree of an Indian Institution, from a Foreign Educational Institution accredited by an Assessment and Accreditation Agency which is approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country for the purpose of assessing, accrediting or assuring quality and standards of educational institutions, shall be eligible for admission to Ph.D. Programme

	2. PhD Entrance Exam
i.	**MUST** qualify a passing score of **Ph.D. Entrance Examination of SVU.** This is a mandatory eligibility criteria for all candidates with exemptions mentioned in Point 2.(ii)
ii.	Exemption Criteria from SVU Ph.D. Entrance Examination are: 1. Candidates who qualified in UGC - CSIR -NET-JRF/ ICMR-JRF / DBT-JRF (BET)/ INSPIRE/ GPAT/ICAR/JEST/ Qualified/valid GATE score in relevant branches /Prime Minister's Fellowships and those qualified in any of the UGC recognized national or state level eligibility tests with a valid fellowship/scholarship in the related subject. 2. Candidates with valid GMAT score for last 2 years (1st Jan 2020 to 31st Dec 2022), minimum GMAT score 350 3. Any candidates having 5 year of teaching/research experience and have published research paper in SCOPUS ; Web of science journal/published patents/grant received from government agencies will be exempted from appearing for the SVU PhD entrance exam but will be required to appear for an interview at the respective departments.The exemption criteria will be applicable ONLY when relevant document are uploaded during application submission. If relevant documents are not submitted , the candidate have to appear for Entrance exam.

Note: However, the candidates who fulfill the above criteria MUST fill the application form as per the schedule displayed on the website.

	3. Other Documents

1. UG Degree or equivalent Mark List
2. UG Degree certificate
3. PG Degree or equivalent Mark List
4. PG Degree or equivalent certificate
5. AADHAR card

6. Degree equivalence / eligibility certificate – wherever is applicable
7. Transfer Certificate and /or Leaving Certificate
8. Migration certificate
9. Two colour passport size Photograph
10. If appearing the PG degree examination – bonafide certificate
11. If employed, then No Objection Certificate (NOC) from the employer – at the time of provisional admission

4. Important Links

UGC Notification 2022 (Link)

2. Categories of Ph.D. Students

1. Candidates with externally funded scholarships/Fellowships; (a full tuition fee waiver will be provided to candidates who join as JRF/SRF under government of INDIA research funded scheme)
2. Candidates who work in funded projects within the University or in approved research centres which are collaborating with the University;
3. Jointly guided PhD or Co-supervised PhD with International Universities;
4. Teaching/work integrated research candidates who are the faculty/employees in pursuit of advancing their academic qualification, recommended by the Head of the Institution and the Academic Advisory Committee. This provision is for those candidates who shall take an undertaking that their routine responsibilities would be duly attended and under no circumstances compromised. The university shall reserve the rights to consider the registration of candidates who do not adhere to these guidelines;
5. Teaching and Research Associates of the Somaiya Vidyavihar University.
6. "Somaiya Vidyavihar University Research fellow under Chancellor's Scholarships Programme".
7. "Any candidates having 5 year of teaching/research experience and have publish research paper in SCOPUS; Web of science journal/published patents/grant received from government agencies will be excepted from appearing for the SVU PhD entrance exam but will be required to appear for an interview at the respective departments"
8. Candidate is permitted to pursue studies on a part-time basis provided all the conditions stipulated in UGC 2022 regulations are fulfilled.

3. Overview of Steps involved in Ph.D. Programme

Sr.No.	Steps
Ph.D. Pre-selection Phase	
1.	Advertisement / Call for SVU Ph.D. entrance exam in November (Janaury Batch) & March (July Batch) 0n website /media handles
2.	Acceptance of the applications for Ph.D. entrance examination along with the applications processing fee
3.	Execution of Ph.D. entrance examination for all Ph.D. programmes
4.	Declaration of Ph.D. entrance examination results

5.	Selection process - Display of list of eligible shortlisted candidates for interview
6.	One- on -one Interviews of shortlisted candidates before an expert panel
7.	Display of selected candidates for provisional admission - Selection process complete

Provisional Admission Phase

8.	Provisional admission and payment of fees in accounts/admin office of the colleges.
9.	Orientation and initiation of course work (1 year – 2 sem)
10.	First semester encompasses research methodology & publication ethics along with subject specific topic. Second semester majorly focus on building research , technical & soft skills. It includes research activities, lab rotation and research proposal drafting & presentation and its evaluation.
11.	ATKT examination for the semester I and II for unsuccessful candidates or for grade improvement
12.	Issue of mark sheets for course work of semester I and II

Allotments & Registrations

13.	Allotment of the guide at individual college-level /department (within the first six months of provisional admission)
14.	Topic approval of the thesis work within 2-3 months after Qualifying course work examination
15.	Registration for Ph. D programme

PhD Phase

16.	Appointment of Examiners and chairman from Research Committee
17.	Annual Progress Seminars (APS) and Intermediate Progress Seminar (IPS) for the academic year by Doctoral Advisory Committee (DAC)

Submission & defence

18.	Approval of examiners to present pre-synopsis in one of the APS and IPS
19.	Presentation of pre-synopsis and its approval by the examiners
20.	Submission of thesis to COE office
21.	Sending the thesis to reviewers
22.	Receipt of reviews about thesis from the reviewers
23.	The final defence of the thesis
24.	Submission of the final corrected thesis after defence
25.	Issue of provisional Ph.D. certificate
26.	Issue of Ph.D. certificate
	The steps and the progress evaluation of Ph.D. students by the committee/examiners/experts will be as per the provisions of Ph.D. regulations

4. Pattern and syllabus of SVU Ph.D. Entrance Examination

Paper-1 General Aptitude Test – MCQs of 50 marks with 40 questions - 10 questions of 2 marks each and 30 questions of 1 mark each **– duration of the test 50 min.**
- no negative marking and options
a) Logical Reasoning & Language aptitude
b) Research Methodology

Paper – 2: Subject Specific Test – 50 marks – duration 1 and half hours
a) Multiple Choice Questions – Maximum marks – 10 – MCQs of 10 marks with 10 questions – no negative marking and options
b) Theoretical / Descriptive Questions – Maximum marks 40 – descriptive type six questions each of 10 marks – any four to be solved

5. About Course Work

The course work will be of one academic year (two semesters) and out of which first semester will be full time. It is expected that during the first semester, the student will report the college/department/section/laboratory for attending the sessions as per Timetable. The student will have to complete total of 9 credits (semester I) + 9 credits (semester II) = total 18 credits with CGPI as per the Ph.D. regulations to become eligible for the registration to Ph.D. programme.

6. Fee Structure of Ph.D. Program
(This is common across disciplines, all categories of students)

Particulars	@Total Fees per annum (₹)	
	First Year	Second Year Onwards
Tuition Fee	30,000/-	30,000/-
Development Fee	10,000/-	10,000/-
Examination Fee	10,000/-	10,000/-
Caution money Deposit (Refundable)	1,000/-	-----
Library Deposit (Refundable)	2,000/-	-----
Total (₹)	53,000/-	50,000/-
@ If paid provisional admission fee then should be deducted from total fee		
Link for fees payment (Fees will be accepted via online payment gateway only and in no case, it can be paid using any other type of mode of payment and to any office/person)	https://myaccount.somaiya.edu/#/login	

7. Registration, Synopsis & Ph.D. Thesis Submission Fees

Particulars	Amount
Registration fees	5000
Approval of Synopsis of Ph.D. Thesis Topic	5000
Ph.D. Thesis Submission	10000
Total	20,000/-

Note:

1. Registration fees to be paid by the Ph.D. scholars before submitting the application for Registration for Ph.D.

2. Synopsis & Ph.D. Thesis Submission fees to be paid by the Ph.D. scholars before submission of synopsis.

8. Payment of fees schedule for Provisional admission and subsequent years of Ph.D. programme

Program Academic Year	Particulars	Amount in Rupees (₹)	Payment Schedule
First Year	Total fee	53,000/-	Within eight days from the date of receiving the offer letter
Second Year and Onwards	Total fee	50,000/-	Within first week from the commencement of the new Academic Year
Link for fees payment (Fees will be accepted via online payment only and in no case it can be paid using any other mode of payment and to any office/person)		https://myaccount.somaiya.edu/#/login	
Note: Students have to pay the full fees of the program per year till the submission of the thesis			

9. Guidelines to make fee payment in Online Mode

There is a provision of ONLINE PAYMENT of college fees for student's' convenience 24x7 on or before the scheduled due date. Student will get notification from the institute in three ways.
1) SMS
2) Email
3) Notification on myaccount.somaiya.edu portal

In the notification there will be a link to make the payment. You just need to click on the link and follow below simple steps to make the payment.

STEP 1: Link will take you to myaccount.somaiya.edu portal. Use Somaiya SVV Net ID and password to login. Want to know more about myaccount.somaiya.edu click on https://somaiya.edu/media/pdf/SVVNetID_and_Email%20id.pdf

STEP 2: Login, select 'instalments' and click on "**Pay Now**".

STEP 3: System will redirect to Online Payment Gateway. Fill in the required information and follow payment options to complete the payment cycle.

STEP 4: After the successful payment, the payment receipt will be available at student's MyAccount portal

10. Admission Cancellation policy of Ph.D. programme
(All Categories of Ph.D. Students)

If the candidate has accepted the allotted seat by paying the fees and later chooses/decides to withdraw from the programme of study, then cancellation option is available at his/her MyAccount login.

The college shall follow the below system for deduction of fees against the cancellation request for the candidate.

Sr. No.	Point of time when the application for admission cancellation is received by the college	Applicable Deduction
1	15 days or more before the date of commencement of academic term	Rs 5,000/-
2	Less than 15 days before the date of commencement of the academic term	10% of total fees
3	Less than 15 days from the date of commencement of the academic term	20% of total fees
4	On or beyond the 15th day but within six weeks from the date of commencement of the academic term	50% of total fees
5	More than six weeks from the date of commencement of the academic term	100% of total fees

Note:
- Total Fees for the program per year is Rs. 50,000/- for All Categories of Ph.D. Students
- Tentative date of commencement of every academic term will be announced on website.

Typical Sample example for further illustration to know about cancellation charges with reference to the date of commencement of term
Refer the below example for clarification of Ph.D. admission cancellation policy Assume that the academic term commences from 15th July of a particular academic year. Based on this assumption, following table illustrates important dates of cancellation policy:
Illustration:

Sr.	Point of time when an application for admission cancellation is	Applicable Deduction

No.	received by college	
1	Cancellation on or before 30th June (up to 11.59pm)	Rs 5,000/-
2	Any time from 1st July to 14th July (up to 11.59pm)	10% of total fees
3	Any time from 15th July to 28th July (up to 11.59pm)	20% of total fees
4	Any time from 29th July to 25th August (up to 11.59pm)	50% of total fees
5	After 25th August	100% of total fees

11. Process of getting documents submitted return

After verifications of documents, within 7 days, documents will be returned to students.

Faculty of Engineering & Technology
(K J Somaiya College of Engineering)

Subjects Offered:

- Computer Engineering
- Electronics Engineering
- Electronics and Telecommunication Engineering
- Information Technology
- Mechanical Engineering
- Energy Engineering

Computer Engineering

About Research Center

Department of Computer Engineering offers a Doctoral programme, focusing the niche research areas in Computer Engineering. This Ph.D. Programme is for those candidates, who are interested predominantly in a research career in Computer Engineering. After successfully completing the doctorate programme, candidates can get multiple employment opportunities in academic and research institutes as well as in industry, as expert in interdisciplinary domains of design and development of system and application software.

The department offers wide opportunity of research in the domain of Data Science, Big Data Analytics, Computer Vision, Cyber Security, Networks and Cryptography, Wireless Networks, High Performance Computing, Image Analysis and Interpretation, Internet of Things, Artificial Intelligence and Machine Learning. Ph.D. Programme in Computer Engineering also fosters various specialized research areas such as System Programming, Algorithm Design and Analysis, Satellite Image Processing, GIS and Applications, Embedded Systems and Applications, Computer Graphics, AR-VR Technology, etc.

The Faculty of the Computer Engineering department is associated with funded research projects with eminent research institute North Eastern Space Application Centre (NESAC), Department of Space and KJSCE is a technology partner. K. J. Somaiya College of Engineering is a network institute of Indian Institute of Remote Sensing (IIRS) Outreach Programme. Funded projects are carried out related to areas of Space research, Image Analysis and Interpretation and interdisciplinary domains.

The Computer Engineering research centre is well equipped with various latest modelling and simulation software, along with high performance server and subscription to web services like AWS.

Eligibility at UG / PG Degree	
Branch of study at UG (Engineering/ Technology)	Computer Science and Engineering, Computer Engineering, Information Technology, Computer Technology, Computer Science and Technology, Electrical Engineering, Electronics and Telecommunication Engineering, Electronics Engineering, Instrumentation Engineering, Power Electronics, Information Technology / Computer Science, Information Science and Engineering, Information Engineering, Information and Communication technology, Information Technology and Engineering.
Branch of study at PG (Engineering/ Technology)	Computer Science and Engineering, Computer Engineering, Information Technology, Computer Technology, Computer Science and Technology, Electrical Engineering, Electronics and Telecommunication Engineering, Electronics Engineering, Instrumentation Engineering, Power Electronics, Information Technology / Computer Science, Information Science and Engineering, Information Engineering, Information Science and Engineering, Information and Communication technology, Information Technology and Engineering
Other Eligible Streams	Master of Computer Application (MCA) MSc in Computer Science/IT Master of Science (MS) Note : Candidates with these streams are eligible Only with Valid GATE Score in Computers/Sponsorship

Syllabus for Entrance Examination
Engineering and Discrete Mathematics and Probability: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Random variables. Uniform, normal, exponential, Poisson and binomial distributions. Mean median, mode and standard deviation. Conditional probability and Bayes theorem. Digital Logic, Computer Organization and Operating System: Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic, Memory hierarchy: cache, main memory and secondary storage, I/O interface, Processes, threads, inter-process communication, concurrency, deadlock and synchronization, CPU scheduling. Memory management and virtual memory, File systems, Basics of High-Performance Computing.

Programming and Data Structures and Algorithms: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, graphs, Searching, sorting, hashing, Algorithm design techniques: greedy, dynamic programming and divide-and-conquer.

Theory of Computation and Compiler Design: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability. Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

Database Management: ER-model, Relational model, relational algebra, SQL, Integrity constraints, normalization forms, Transactions deadlock handling and concurrency control, File organization, indexing (B and B+ trees), Concepts of Data Mining and Warehousing.
Computer Networks and Security: TCP/IP Layering concepts, LAN technologies, Data link layer and Flow and error control techniques, routers and routing algorithms, congestion control, Application layer protocols, Wireless Networks Basics, Network and Information security, authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls, IDS.

Artificial Intelligence, Computer Vision and Big Data Analytics: Machine learning algorithms: regression, clustering and classification, Neural networks and Fuzzy systems, Image processing, analysis and interpretation, Big Data processing, analytics and management. Data Visualization techniques.

Electronics Engineering

About Research Center

Department of Electronics Engineering offers a full time Doctoral programme focusing the niche research areas such as computer vision, robotics, circuitry, microfabrication, IoT, control system and power systems, communication engineering, and signal processing and Allied areas. The department hosts a wide variety of research projects in these areas. We welcome you to this challenging field, which offers exciting opportunities in the domains such as mechatronics, information technology, simulation and modelling, data science, communication engineering, electronic circuitry, instrumentation, system automation, etc.

The department offers wide opportunity of research with computer programming, algorithm design, machine learning, advanced embedded systems, computer graphics, computing, data science, AR-VR technology, etc.

The research areas under Computer vision and Signal processing: Image processing, Sensor fusion, Intelligent systems, Autonomous systems, Speech modelling, speech recognition, biomedical signal processing, communication. Students can focus on various research areas under Robotics and Control Systems such as motion planning, kinematics, sensors, instrumentation, Simulation and modelling of systems, design of

industrial control systems and industrial automation, process control. The research areas under VLSI and Embedded systems are circuit design, PCB layout, analog and mixed signal VLSI, digital VLSI, etc. Students work on various challenges during the course making them ready for the Industry. Various statistical software are also available to help in analysing research data.

Faculty at Department of Electronics Engineering has expertise in various areas which includes Embedded systems, Autonomous systems, AR-VR systems, etc. They also have publications in peer-reviewed journals and can offer consultation in various domains of Electronics

Eligibility at UG/PG Degree	
Branch of study at UG	Electronics Engineering / Electronics and Telecommunication Engineering / Electronics and Communication Engineering / Instrumentation & Control Engineering / Electrical Engineering / Control and Power engineering / Electrical and Electronics Engineering / Computer Engineering / Industrial Electronics / Information Technology / Industrial Engineering / Computer Technology /Computer Science and Technology / Data-science / Artificial Intelligence / Cyber Security / Data-Science & Artificial Intelligence / Machine Learning /Biomedical engineering / BioTechnology / Information Technology / Computer Science / Information and Communication Technology / Mechatronics / Robotics / Information Technology and Engineering / Mechatronics / Embedded systems / Control engineering / Computer Science and Engineering / Computer Technology / Electrical and Electronics Engineering / Instrumentation Engineering / Power Electronics / Information and Communication Technology / Telecommunication / Robotics & Automation / Electronics & Automation / Engineering /Allied Branches.
Branch of study at PG	Electronics Engineering / Electronics and Telecommunication Engineering / Electronics and Communication Engineering / Instrumentation & Control Engineering/ Signal Processing / VLSI / Robotics / Control systems / MEMS / Power Electronics / Embedded systems / Electrical Engineering / Computer Science and Engineering / Control and Power engineering / Electrical and Electronics Engineering / Computer Engineering / Information Technology / Computer Technology / Computer Science and Technology/ BioMedical engineering/ BioTechnology / Information Technology and Computer Science / Information Science and Engineering / Information Engineering / Information Science and Engineering / Information and Communication Technology / Information Technology and Engineering / Data science / Artificial Intelligence / Machine Learning/ Mechatronics / Computer Science and Engineering / Electrical and Electronics Engineering / Electronic and Communication Technology / Instrumentation Engineering / Information and Communication Technology / Telecommunication Engineering / Allied Branches.

Syllabus for Entrance Examination

Engineering and Discrete Mathematics and Probability: Propositional and first order logic. Sets.

Network Theory: Nodal and Mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; circuit analysis; Frequency domain analysis; 2-port Networks; transfer functions.

Electronic Devices & Circuits: Energy bands; diffusion, drift current, mobility of electrons; P-N junction diodes; Zener diode, BJT, MOSFET, LED, photodiode; photolithography; CMOS; HDL, VHDL, Nanotechnology; MEMS.

Analog Circuits: clipping, clamping, and rectifiers; op-amp circuits; Active filters; oscillators: wave- shaping circuits; Supply regulation; 555 timers and applications.

Digital Circuits: Boolean algebra, Karnaugh map, logic gates; arithmetic circuits, multiplexers, decoders, and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers, sample and hold circuits, ADCs and DACs; ROM, SRAM, DRAM; microprocessors and microcontrollers, memory, and I/O interfacing.

Signal & Systems: Laplace transform, continuous-time and discrete-time Fourier series, continuous- time, and discrete-time Fourier Transform, DFT and FFT, Z-transform. LTI Systems, parallel and cascade structure, signal processing; filter design; correlation; wavelets.

Control Systems: Control system components; Feedback; Transfer function; Block diagram; Signal flow graph; Transient and steady-state analysis; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; state-space analysis.

Communication Systems: Random processes: autocorrelation and power spectral density, Analog communications: AM, FM, PM; entropy, channel capacity theorem; Digital communications: PCM, DPCM, ASK, PSK, FSK, QAM, Concepts of SNR and BER, error correction coding, Hamming codes; ISI; TDMA, FDMA, and CDMA, Maxwell's equations, phase & group velocity, Transmission lines, characteristic impedance, impedance matching, S-parameters, Waveguides, Antennas; radar; optical fibres.

Electronics and Telecommunications Engineering

About Research Center

Department of Electronics and Telecommunication Engineering offers a Doctoral programme, focusing on the upcoming research areas such as Signal Processing,

Communication Engineering, Networking etc. We welcome you to these challenging fields, which offer exciting opportunities in the development of technology in the domain of Electronics and Telecommunication. After successfully completion of the doctorate programme, candidates will have the opportunities to start their career in academics, research institutes as well as in industry, as an expert in interdisciplinary domains of software design and development of technology.

The Signal Processing group has an expertise in Image Processing & Video Processing, Multirate Signal Processing, Wavelets, Machine Learning, Artificial Intelligence Data Networks & Security, Signal Compression and Cryptography. The Communication Engineering group has huge potential in Networking, Wireless Communication, various types of Antennas and Antenna Arrays and RF passive and active devices. Apart from the core telecommunication areas, the department has proficiency in cutting edge technologies like Internet of Things, Machine learning, Artificial Intelligence, Data Science, Computer Vision, Natural Language Processing and Embedded Systems.

To enhance research in core and allied areas, the department of Electronics and Telecommunication is well equipped with high end software and hardware facilities. The department of Electronics and Telecommunication has CISCO Centre of Excellence established with the help of CISCO systems Pvt Ltd. Latest equipment and software related to Networking is available in the CISCO centre. The Department has MOU with TEXAS instruments leading to the establishment of an innovation center in the area of Internet of Things. This innovation centre is equipped with the MSP430 Microcontroller Family, Tiva Launchpad, Sensor Hub Booster Pack, CC3200 Launchpad, CC3100 Boosterpack, etc. The department has hardware facilities like RF sources, Vector Network Analyser, Antenna Pattern Trainer, etc in the domain of RF and Microwave. The department is also well equipped with research and industry-oriented software like MATLAB, NETSIM, CST Microwave Suite and IE3D. In addition to it, the department has a research agreement with BITS Pillani, Hyderabad campus.

Few faculty members are currently working on an intramural research project on 5G and upcoming wireless technology funded by Somaiya Vidyavihar University. A collaborative research in the field of Biomedical Engineering is in process between our department and K J Somaiya Medical and Research Centre, Somaiya Ayurvihar. The department has Mumbai University minor grant projects to its credit.

Eligibility at UG/PG Degree	
Branch of study at UG	Computer Science and Engineering /Computer Engineering/Information Technology/Computer Technology/ Computer Science and Technology/ Electrical Engineering//Electrical and Electronics Engineering/Electronics and Communication Engineering/ Electronics and Telecommunication Engineering/Electronics Engineering/ Electronic and Communication Technology/ Instrumentation Engineering/ Power Electronics/ Information and Communication Technology/ Telecommunication Engineering/ Biomedical Engineering/ Allied Branches or Equivalent from recognized university or eligibility as per AICTE / UGC.

Eligibility at UG/PG Degree	
Branch of study at PG	Computer Science and Engineering /Computer Engineering/Information Technology/Computer Technology/ Computer Science and Technology/ Electrical Engineering//Electrical and Electronics Engineering/Electronics and Communication Engineering/ Electronics and Telecommunication Engineering/Electronics Engineering/ Electronic and Communication Technology/ Instrumentation Engineering/ Power Electronics/ Information and Communication Technology/ Telecommunication Engineering/ Biomedical Engineering/ Allied Branches or Equivalent from recognized university or eligibility as per AICTE / UGC.

Syllabus for Entrance Examination
Probability and Random Processes: Probability, Sampling statistics and parameter estimation, Hypothesis testing, Linear Regression and correlation.   **Network Theory:** Nodal and Mesh analysis; Network theorems; Star-Delta transformation; Circuit analysis; Frequency domain analysis; 2-port Networks; Transfer functions   **Electronic Devices & Circuits:** Energy bands; diffusion, drift current, mobility of electrons; P-N junction diodes; Zener diode, BJT, MOSFET, LED, photodiode; photolithography; CMOS; HDL, VHDL, Nanotechnology; MEMS.   **Analog Circuits:** Clipping, clamping, and rectifiers; op-amp circuits; Active filters; oscillators: wave-shaping circuits; Supply regulation; 555 timers and applications.   **Digital Circuits:** Boolean algebra, Karnaugh map, logic gates; arithmetic circuits, multiplexers, decoders, and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers, sample and hold circuits, ADCs and DACs; ROM, SRAM, DRAM; microprocessors and microcontrollers, memory, and I/O interfacing.   **Signals & Systems:** Laplace transform continuous-time and discrete-time Fourier series, continuous-time, and discrete-time Fourier Transform, DFT and FFT, Z-transform. LTI Systems, parallel and cascade structure, signal processing; filter design; correlation; wavelets.   **Control Systems:** Control system components; Feedback; Transfer function; Block diagram; Signal flow graph; Transient and steady-state analysis; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; state-space analysis   **Communication Systems:** Random processes: autocorrelation and power spectral density, Analog communications: AM, FM, PM; entropy, channel capacity theorem; Digital communications: PCM, DPCM, ASK, PSK, FSK, QAM, Concepts of SNR and BER, error correction coding, Hamming codes; ISI; TDMA, FDMA, and CDMA, Maxwell's equations, phase & group velocity, Transmission lines, S-parameters, Waveguides, Antennas; Radar; Optical fibers; Mobile communication; Satellite communication; Communication Networks; Network security.

Irformation Technology

About Research Center

Department of Information Technology offers Doctoral programme where the research adheres to the rapid evolution of Information Technologies, which is a backbone of almost all business domains. This Ph.D. programme facilitates a productive research experience by binding information and society. This programme is intended for the candidates interested in a research career, teachers and industry professionals positioned in research and development organisations.

Ph.D. Programme in Information Technology includes various specialized research areas such as Artificial Intelligence and Machine Learning, Big data processing and Analytics, Information / Cyber Security, Image Processing and Mining, Geographical Information Systems and Geospatial Data Analytics, Biomedical informatics, High-Performance Computing, Embedded Systems, IoT, AR-VR Technologies, Database technologies, Robotics and control systems etc. The department has proficient faculty to guide in the above-mentioned areas and department laboratories also possess essential infrastructural facilities required for the research activities.

Eligibility at UG/PG Degree	
Branch of study at UG	Computer Science and Engineering, Computer Engineering, Information Technology, Computer Technology, Computer Science and Technology, Electrical Engineering, Electrical Engineering [Electrical and Power], Electrical Engineering [Electronics and Power], Electronics and Communication Engineering, Electronics and Telecommunication Engineering, Electronics Engineering, Electrical and Power Engineering, Computer Science, Electronics Technology, Electrical, Electronics and Power, Telecommunication Engineering, Computer Engineering and Application, Information Science and Engineering, Information Engineering, Information and Communication technology, Information Technology and Engineering

Eligibility at UG/PG Degree

Branch of study at PG	Computer Science and Engineering, Computer Engineering, Information Technology, Computer Technology, Computer Science and Technology, Electronics and Communication Engineering, Electronics and Telecommunication Engineering, Electronics Engineering, Computer Science, Electronics Technology, Telecommunication Engineering, Computer Engineering and Application, Information Science and Engineering, Information Engineering, Information Science and Engineering, Information and Communication technology, Information Technology and Engineering, Allied Branches or Equivalent from recognized university or eligibility as per AICTE / UGC

Syllabus for Entrance Examination

Engineering and Discrete Mathematics and Probability: Linear algebra, Matrix algebra; Systems of Linear Equations; Eigen Values and Eigenvectors, Mean, median, mode, standard deviation, dispersion, skewness, Sets, Graphs, groups, Relations and Functions. Uniform, normal, exponential, Poisson and binomial distributions. Conditional probability and Bayes theorem, sampling and sampling methods.

Digital Logic, Computer Organization and Operating System: Boolean algebra. Number representations and computer arithmetic, Memory hierarchy: cache, main memory and secondary storage, I/O interface, Processes, threads, inter-process communication, concurrency, deadlock and synchronization, CPU scheduling. Memory management and virtual memory, File systems, Basics of High-Performance Computing.

Programming and Data Structures and Algorithms: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, graphs, Searching, sorting, hashing, Algorithm space and time complexity, Algorithm design techniques: greedy, dynamic programming and divide-and-conquer.

Database Management: ER-model, EER –Model, Relational model, relational algebra, SQL, Integrity constraints, normalization forms, Transactions deadlock handling and concurrency control, indexing and hashing. object oriented, distributed, spatial, in-memory, mobile and NoSQL databases, Data Warehousing / Datalake design and analytics.

Computer Networks and Security: ISO/OSI reference model, TCP/IP model, LAN technologies, Wireless Networks Basics, Network and Information security: cryptography, database security and Access control, Cyber-crime and Cyber security, basics of malware analysis, digital forensics.

Application development and Technologies:

Software development phases, Software testing methodology. Web application architecture, HTML/ XML, fundamental concepts for client side and server-side scripting.
Cloud architecture and services, Wireless Sensor Network, IoT architecture and applications

Artificial Intelligence, Computer Vision and Big Data Analytics:
Machine learning algorithms: regression, clustering, classification. Association and correlation. Neural networks and Fuzzy systems.
Accuracy/error measures of these algorithms.
Image processing, analysis and interpretation. Big Data processing framework, Big data analytics and management. Data Visualization techniques.

Mechanical Engineering

About Research Center

Department of Mechanical Engineering offers a full time Doctoral programme focusing the niche research areas such as Thermal-Fluid sciences, Design engineering, Manufacturing engineering and Allied areas, etc. The department hosts a wide variety of research projects in these areas. We welcome you to this challenging field, which offers exciting opportunities in the development of more efficient fuels and fuel systems, new energy sources, energy conservation techniques and equipment's, biomedical equipment, and other areas related the thermal and fluid science.

The department offers wide opportunity of research with Refrigeration and Cryogenics, Heat and Mass Transfer applications, I C Engines, Alternative fuels, Heat exchanger design, Modeling of Thermal Systems, Industrial Applications of Heat and Mass Transfer concepts. HVAC, Energy Conservation and Management and Energy Audit, Air Pollution and Control, Generation and Characterization of Nano Particles, Design and Development of Renewable energy Systems (Solar, biomass and Wind), Design and Development of Industrial and Environmental Air Pollution Measuring and Control Devices.

The Design Engineering Group has expertise in various areas which includes Tribology, Mechanics of Composite Materials, Fracture Mechanics, Lubrication and Bearing, Machine dynamics, Fluid film bearings, Conical Hydrodynamic Journal Bearing, Product Design and development material science, metallurgy, wear analysis, design optimization etc. Department research focuses for improving experimental and numerical methods for reliable evaluation of new materials and systems.

The research areas under Manufacturing and Allied there are FEA, Mechatronics, Artificial Intelligence, Mass Customization, Additive Manufacturing, Medical Device

Innovation, Engineering optimization, Industrial Engineering. Manufacturing Simulation, Multi-Criterion Decision Making, Design of Experiment, Multi body dynamics simulation, Robotics, Investment casting, Computational Fluid Dynamics, Big data analytics, smart manufacturing, sustainable practices and supply chain management. Students work on various challenges using latest modelling and analysis software making them ready for the Industry. Various statistical software are also available to help in analysing research data.

Eligibility at UG/PG Degree

Branch of study at UG	Mechanical / Industrial / Production / Automobile / Manufacturing / Aerospace / Aeronautical and allied branches.
Branch of study at PG	Mechanical, Automobile, CAD/CAM, Aerospace, CAD-CAM-CAE, Aeronautical, Automotive, Machine Design, Energy Technology, Energy Engineering, Heat Power Engineering, Energy System, Energy Studies, Thermal Engineering, Design Engineering, Manufacturing Engineering, Manufacturing System Engineering, Mechatronics, Mechanical Design, Thermal Power Engineering, Production Engineering, Robotics & Automation, Metallurgy & Material Science, Product Design Development, Robotics, Industrial Engineering, Industrial Management, Product Lifecycle Management, Machine Tool Engineering, System & Control Energy Studies, Bio-Medical Engineering, Material Science, Manufacturing & Modelling Engineering, Material Engineering, System Science & Automation, Nano Science, Nano Engineering, Nano Technology, Industrial Tribology and Maintenance Engineering, CAD-CAM Robotics, Process Engineering, Automobile Design, Aerospace Science and Engineering

Syllabus for Entrance Examination

Engineering Mechanics: Resultant of force system, Equilibrium of forces, Trusses, Friction, Kinematics of particles Kinetics of particle –Impulse and momentum (linear), Collisions.
Strength of Materials: Stress and strain, elastic constants, Poisson's ratio, Mohr's circle; thin cylindrical and spherical shells; shear force and bending moment diagrams; stresses in beams and columns, torsion of circular shafts; Euler's theory of columns;
Theory of Machines: Analysis of plane mechanisms; cams and followers; Flexible connector, gear trains; clutches, brakes, flywheel and governors; gyroscope,
Mechanical Vibrations: Linear Free and forced single degree of freedom vibration; longitudinal and torsional systems, vibration damping, critical speeds of shafts.
Machine Design: Design for static and dynamic loading; failure theories; fatigue strength; bolted and welded joints; shafts, spur and helical gears, Tribology: wear friction and lubrication, bearings, suspension system
Fluid Mechanics and Machinery: Fluid properties; fluid statics, forces on submerged bodies, control-volume analysis of mass, momentum and energy; fluid acceleration; Bernoulli's equation; viscous flow of incompressible fluids, boundary layer, Laminar Pipe

Flow, elementary turbulent flow, flow through pipes, head losses in pipes, and fittings. Flow Measurements. Impulse and reaction Turbines (Pelton, Francis and Kaplan), velocity diagrams, calculation of power and efficiencies.

Thermodynamics: Thermodynamic systems and processes, properties of pure substances, Zeroth , first and second law of thermodynamics; application of first and second law to flow and non-flow processes. Availability and irreversibility; Properties of Steam, Vapor power cycles, Working and analysis of different types of Steam Nozzle and Steam turbines, regeneration and reheat. Gas power cycles: Air-standard, Otto, Diesel, and dual cycles, Fuel air cycles and actual cycles. Gas Turbines and Jet Propulsion. Methods to improve efficiency of Gas turbines. Testing and Performance of I C Engines and Various engine processes. Compressible fluid flow applied to nozzle, stagnation properties, Mach number and its analysis. Air refrigeration cycle and Vapor compression refrigeration cycle, Types of refrigerants; properties of moist air, basic psychrometric processes and analysis of air conditioning system.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, heat transfer through fins; unsteady heat conduction, heat transfer in Internal and external flows: thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, Free and forced convection heat transfer correlations, effect of turbulence; Heat exchanger performance, LMTD and Effectiveness - NTU methods; radiative heat transfer, Laws of radiation, Various surfaces involved in radiation, view factors, radiation network analysis; radiation heat transfer between two bodies, radiation shield and its application.

Engineering Materials: Structure and properties, phase diagrams, heat treatment. Principles of Casting, Forming and Joining Processes: Types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding.

Machining and Machine Tool Operations: Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, design of jigs and fixtures.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools.

Production Planning and Control:
Forecasting models, aggregate production planning, scheduling, materials requirement planning.

Inventory Control: Deterministic models; safety stock inventory control systems.

Operations Research: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

Energy Engineering

About Research Center

Energy is an important required parameter for development of a nation. Due to increase in energy demand, Fossil fuel reserves in the country are depleting and their continuous use has increased the level of pollution in the atmosphere, which in turn has increased adverse effects on health and environment. Hence there is a need to develop viable cost effective alternatives and identifying different ways in which energy can be saved. It is important here to note that we cannot go on producing more energy as our demands are increasing because of the limitations on the natural resources.

A better way of making more energy available would be using less energy to perform the same tasks. Renewable Energy Sources can provide possible long term solutions for the energy problems. There is a need to pursue energy efficiency and Demand Side Management to improve the efficiency of supply and utilization devices and systems. The development of new energy technologies provides a technological challenge as well as significant business opportunity. In order to help meet these challenges, the Department of Mechanical Engineering has started M.Tech., Program in Energy Engineering and PhD Program in Energy Engineering with a mission to develop sustainable energy systems and solutions for the future

Department of Mechanical Engineering offers a full time Doctoral programme focusing the niche research areas such as Thermal-Fluid sciences, Design engineering, Manufacturing engineering and Allied areas, etc. The department hosts a wide variety of research projects in these areas. We welcome you to this challenging field, which offers exciting opportunities in the development of more efficient fuels and fuel systems, new energy sources, energy conservation techniques and equipment's, biomedical equipment, and other areas related the thermal and fluid science. The department offers wide opportunity of research with Refrigeration and Cryogenics, Heat and Mass Transfer applications, I C Engines, Alternative fuels, Heat exchanger design, Modeling of Thermal Systems, Industrial Applications of Heat and Mass Transfer concepts. HVAC, Energy Conservation and Management and Energy Audit, Air Pollution and Control, Generation and Characterization of Nano Particles, Design and Development of Renewable energy Systems (Solar, biomass and Wind), Design and Development of Industrial and Environmental Air Pollution Measuring and Control Devices.

The Design Engineering Group has expertise in various areas which includes Tribology, Mechanics of Composite Materials, Fracture Mechanics, Lubrication and Bearing, Machine dynamics, Fluid film bearings, Conical Hydrodynamic Journal Bearing, Product Design and development material science, metallurgy, wear analysis, design optimization etc. Department research focuses for improving experimental and numerical methods for reliable evaluation of new materials and systems.

The research areas under Manufacturing and Allied there are FEA, Mechatronics, Artificial Intelligence, Mass Customization, Additive Manufacturing, Medical Device

Innovation, Engineering optimization, Industrial Engineering. Manufacturing Simulation, Multi-Criterion Decision Making, Design of Experiment, Multi body dynamics simulation, Robotics, Investment casting, Computational Fluid Dynamics, Big data analytics, smart manufacturing, sustainable practices and supply chain management. Students work on various challenges using the latest modelling and analysis software making them ready for the Industry. Various statistical software are also available to help in analyzing research data.

Eligibility at UG/PG Degree	
Branch of study at UG	Automobile Engineering, Aeronautical/Aerospace Engineering, Chemical Engineering, Civil Engineering , Electrical Engineering, Energy Engineering, Electronics Engineering, Energy Science & Engineering, Mechanical Engineering, Metallurgical Engineering, Materials Science & Engineering, Thermal Power Engineering , Production Engineering, Petroleum Engineering from Indian Institute of Petroleum, Electrical & Electronics Engineering, Environmental science, Environmental Engineering, any allied / relevant branch of engineering
Branch of study at PG	Automobile Engineering, Aeronautical/Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Energy Engineering, Electronics Engineering, Energy Science & Engineering, Energy Studies, Energy Systems, Energy Engineering, Mechanical Engineering, Metallurgical Engineering, Materials Science & Engineering, Thermal Power Engineering , Production Engineering, Petroleum Engineering from Indian Institute of Petroleum, Electrical & Electronics Engineering, Environmental science, Environmental Engineering, any allied / relevant branch of engineering

Syllabus for Entrance Examination (Choose any one from Section A and Section B)
Section A: Mechanical Engineering and allied branches
Material Science and Engineering: Structure and properties, phase diagrams, heat treatment. Principles of Casting, Forming and Joining Processes: Types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding. **Thermal Engineering:** Thermodynamic systems and processes, properties of pure substances, Zeroth, first and second law of thermodynamics. Properties of Steam, Vapor power cycles, Gas power cycles: Air-standard, Otto, Diesel, and dual cycles. Gas Turbines and Jet Propulsion. Methods to improve efficiency of Gas turbines. Testing and Performance of I C Engines and Various engine processes. Air refrigeration cycle and Vapor compression refrigeration cycle, Types of refrigerants; properties of moist air, basic psychrometric processes and analysis of air conditioning system. Modes of heat transfer; one dimensional heat conduction, heat transfer through fins; unsteady heat

conduction, Free and forced convection heat transfer and correlations, effect of turbulence; Heat exchanger performance, LMTD and Effectiveness - NTU methods; radiative heat transfer, Laws of radiation, Various surfaces involved in radiation, view factors, radiation network analysis; radiation heat transfer between two bodies, radiation shield and its application

Fluid Mechanics and Machinery: Fluid properties; fluid statics, forces on submerged bodies, control-volume analysis of mass, momentum and energy; fluid acceleration; Bernoulli's equation; viscous flow of incompressible fluids, boundary layer, Laminar Pipe Flow, elementary turbulent flow, flow through pipes, head losses in pipes, and fittings. Flow Measurements. Impulse and reaction Turbines (Pelton, Francis and Kaplan), velocity diagrams, calculation of power and efficiencies.

Renewable Energy: Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. Collectors types-flat plate collectors, concentrating collectors, Introduction to Solar air heaters, solar driers, solar energy-thermal storage, solar pond, solar water heaters, solar distillation, solar still, solar cooker, solar heating & cooling of buildings. Solar photovoltaic energy conversion - Principles - Physics and operation of solar cells. Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features. Design considerations of horizontal and vertical axis wind machines: analysis of Aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Biomass conversion technologies, Biogas generation plants, classification, advantages and disadvantages, constructional details, site selection, digester design consideration, filling a digester for starting, maintaining biogas production.

Introduction to biofuel: vegetable oil, bio-diesel, bio-ethanol, oil from biomass pyrolysis, utilization of biomass

Section B: Electrical and Electronics Engineering and allied branches

Electrical network analysis (excited by DC independent and dependent sources): Mesh and nodal analysis, Network Theorems: Superposition, Thevenin's, Norton's and Maximum Power Transfer theorem.

Electrical network analysis (excited by AC sources): Steady state behaviour of single phase AC circuits with pure R, L, and C, concept of inductive and capacitive reactance, phasor diagram of impedance, phase relationship in voltage and current. RL, RC and RLC series and parallel circuits, concept of impedance and admittance, power triangle, power factor, active, reactive and apparent power, concept of power factor improvement. Analysis of network excited by AC using mesh and nodal analysis.

Transient response of R-L, R-C, R-L-C circuits (Series and Parallel combination): Initial conditions, transient and steady state response, solution based on time domain analysis, solution based on Laplace transforms.

Three phase AC circuits : Three-phase balanced circuits, voltage and current relations in star and delta connections, Power relations, Measurement of power in 3-phase systems

Basic Electronic devices/circuits and their applications: P-N Junction diode: Construction and working of PN junction diode, current voltage characteristics, diode equation, Zener Diode: Construction and working, current voltage characteristics. Zener diode as voltage regulator, diode rectifiers and their parameters.

Field effect transistor: FET operation, MOSFET equation, Output and transfer characteristics

Operational Amplifiers: Characteristics of IDEAL OPAMP, open loop and Closed loop configuration and applications such as comparator, inverting and noninverting amplifier, adder and subtractor.

Single phase transformer: Construction and principle of working, emf equation of a transformer, losses in transformer, equivalent circuit of Ideal and practical transformer, voltage regulation and efficiency of transformer.

Power electronic devices and circuits: Silicon controlled rectifier, Power MOSFETS, Controlled rectifier circuits

Faculty of Management Studies
(K J Somaiya Institute of Management)

Subjects Offered:

- Marketing
- General Management
- Human Resources Management
- Finance and Law
- Economics
- Business Analytics
- Operations including Logistics and Supply Chain Management
- Data Science and Technology

About Research Center

K J Somaiya Institute of Management is a constituent institute of Somaiya Vidyavihar University. It started in the year 1981. The institute's vision is "Our dream is to build a world class research and teaching institution that is global in the reach of its ideas and universal in its service".

K J Somaiya Institute of Management is committed to achieving exemplary stands in management education to achieve its vision and the redefined parameters of management education. The centre is committed to academic excellence and intellectual competence. Freedom of expression and inquiry, exchange of ideas, intensive classroom instruction, cultural activities, and numerous formal and informal events of the Somaiya Vidyavihar community combine to ensure that each student receives a thorough education in tune with the global realities of a rapidly evolving world.

As a research centre, the focus is on building research culture, be it basic or applied research, linkages, and providing research education programs, to facilitate quality research and opportunities for multi-disciplinary and cross-functional research. Each area has vast and diversified experience. KJSIM research centre enables interaction between faculty, scholars, students, and industry to enhance research opportunities, academic excellence, real-world problem solving, and knowledge creation and dissemination. It provides unique inquiry-based learning opportunities for students and involves them actively in relevant academic forums and community outreach. Students and faculty are encouraged to take international research projects and collaborations. The centre also focuses on timely review of the scholars' progress, presentations and provides adequate support. The faculty and scholars are encouraged to publish in reputed journals (Web of Science, Scopus Indexed, UGC, ABDC, ABS etc.) by providing continuous support and guidance.

Eligibility at UG/PG Degree	
Branch of study at UG	Graduate in any Discipline/Subject/Branch
Branch of study at PG	Two/Three years Master's degree in Commerce, Management or allied discipline. OR Two/Three years Master's degree in Computer Application and Information Technology allied discipline OR Two/Three years Master's degree in Statistics, Mathematics, Operation Research, or allied OR Two/Three years Master's degree in Behavioral Science (Economics, Psychology, and Sociology) OR Professional qualification, which is equivalent to a Master's degree. Or MPhil in Management, Commerce or allied discipline OR Ph.D from any recognised University

Syllabus for Entrance Examination
First-Year MBA Programme

Faculty of Sciences
(S K Somaiya College)

Subjects Offered:

- Biotechnology
- Computer Science
- Nutraceuticals
- Polymer Science
- Mathematics

Biotechnology

About Research Center

Biotechnology is a broad discipline in which biological processes, organisms, cells or cellular components are exploited to develop new technologies. New tools and products developed by biotechnologists are useful in **research**, agriculture, industry and the health sectors.

The research centre in Biotechnology has been established in the Department of Biotechnology, S K Somaiya College, Somaiya Vidyavihar University. The primary focus of the Ph.D. centre for Biotechnology is to provide world class education, training and conduct innovative research at the interface of multiple disciplines to create high quality human resource in disciplinary and interdisciplinary areas of biotechnology in a globally competitive research milieu. Both basic and applied research topics will be addressed. The Ph.D Research programme has started from the academic year 2020-21.

Faculty members also collaborate with scientists from National Institutes in India and abroad. Their research component further strengthens & enriches the teaching programme. Owing to the best academic practices for the teaching programme, this Department has been able to generate excellent human resources in Biotechnology.

The department has an excellent track record of research in various areas of Biotechnology with exposure to various themes. The Faculty members have excellent records of publication in journals with high impact factors and have been granted National patents. At present, we have Ph.D. guides with expertise in Industrial and environmental Biotechnology, Plant tissue culture and IPR. Since several years many of the alumni of the Department are well placed in various premier Institutions as scientists, teachers & entrepreneurs in various parts of the country and abroad. The Department has several collaborative Projects in the pipeline with Michigan State University and KIAAR. The department has several MoUs with organisations of national and international repute. The Department has received DST funds for WoS-A project and Wegyan fellowship for Entrepreneurship from Pune Knowledge Cluster.

The Department of Biotechnology also promotes the students to participate at various competitive events e.g. AVISHKAR to present their hypothesis or preliminary results and get an exposure of cutting-edge futuristic technologies.

KEY FEATURES

- State-of-the-art laboratories
- Department with Ph.D.-qualified faculty
- Dynamic curriculum with right mix of various biological sciences
- Aim for Research-driven opportunities in Institutions in India and abroad.
- Wide range of program and open electives
- Opportunity for students to carry out inter-disciplinary research projects across Medical, Pharma, Life Sciences, Engineering, Bioprocess, etc.
- Workshops and Guest Lectures on a regular basis
- A National-level annual event "CRISPERalis"   and departmental event "BIOZONE" ,organised by the students of the department.

Eligibility at UG/PG Degree

Branch of study at UG	Life Sciences Biotechnology Microbiology Biochemistry Environmental Sciences Botany Zoology Bioinformatics.
Branch of study at PG	Life Sciences Biotechnology Microbiology Biochemistry Environmental Sciences Bioinformatics.

Syllabus for Entrance Examination
CSIR – NET/JRF syllabus 2022 for Life Sciences

Computer Science

About Research Center

The computing and information revolution is transforming society. Computers have changed the way the world produces, manages, processes, computes and analyses data. The diverse area where computer science impacts does not have boundaries.

The Computer Science research centre has been established in the Department of Computer Science, S K Somaiya College, Somaiya Vidyavihar University. The Computer Science Phd. research centre is committed towards transforming and producing cutting-edge research in numerous areas of Computer. The Computer Science Research Centre educational mission is to stay tuned to the needs of researchers. The Ph.D. Research programme has started from the academic year 2020-21.

We organize research programs that provide a mechanism and organizational structure within which collective research activities can take place. Our aim is to work toward advancing software and information technology through research partnerships and educating the next generation of software researchers and practitioners in advanced software technologies. In the Computer Science research centre we address the entire range of research problems that arise from the different sectors.

The faculty of the Computer Science Research Centre engages students to conduct cutting-edge and impactful research in various areas of computer science.

The S K Somaiya Computer Science Research Centre is committed to expanding our goal to provide impactful solutions in computer science research. We offer a supportive environment in which our faculty and students are empowered to pursue the next great advances whether at the core of the field, or in emerging areas that address humankind's greatest challenges through the transformative power of computing.

SALIENT FEATURES

- Best research practices with research laboratories.
- Qualified and experienced research guides to foster the knowledge.
- Touches every aspect of computer science possibilities and outcomes.
- Provide exposure to research opportunities worldwide.
- Opportunity for students to carry out interdisciplinary research projects across Medical Science, Business Tools, Embedded System, Analytical models, etc.
- Enriched student development programs.

- Machine Learning and Artificial Intelligence
- Big Data Analytics, Data Management
- Data Analytics
- Data Visualization
- Machine Learning
- Natural Language Processing
- Agile Methodology
- Computational Linguistics
- Database and Data Mining
- Scientific Computing

Eligibility at UG/PG Degree	
Branch of study at UG	Computer Science Information Technology Mathematics and Statistics Data Science Any branch of Computer Science and Engineering
Branch of study at PG	Computer Science Information Technology Mathematics and Statistics Data Science Any branch of Computer Science and Engineering

Syllabus for Entrance Examination

Engineering Mathematics

Mathematical Logic:- Propositional Logic; First Order Logic.
Probability:- Conditional Probability; Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; uniform, normal, exponential, Poisson, Binomial.
Set Theory & Algebra:- Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Data Structures

Data, Information, Definition of data structure. Arrays, stacks, Queues, Linked lists,

Trees, Binary trees and traversal, Graphs, priority queues and heaps and assimilated algorithms. File structures : Fields, Records and files. Sequential, Direct, index-sequential and relative files. Hashing, Inverted lists and multi-lists, B trees and B+ trees.

Programming in C and C++

Programming language concepts, paradigms and models. Programming in C: Elements of C-Tokens, identifiers, data types, operators in C. Control structures in C. Sequence, Selection and iterations (s). Structured data types in C-arrays, struct, union, String and pointers. I/O statements, User defined and built in functions, Parameter passing. C++ Programming : Elements of C++- Tokens, identifiers, Variables and constants. Data types. Operators, Control statements, Functions parameter passing, Class and objects. Constructors and destructors. Overloading, Inheritance, Templates, Exception handling. Object Oriented Programming Concepts : Class, Object, Instantiation, Inheritance, polymorphism and overloading, dynamic biding, reference semantics and their implementation.

Operating System:

Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Data Mining and Data Warehousing: Concept of Data Mining, Data Warehousing Architecture, Data Mart, OLAP and OLTP Systems. Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

Computer Networks: ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers. Network security basic concepts of public key and private key cryptography, digital signature, firewalls.

Web technologies: HTML, XML, basic concepts of client-server computing

Nutraceuticals

About Research Center

The term 'Nutraceutical' originates from the combination of the words 'nutrient' and 'pharmaceutical.' Thus, nutraceuticals are bioactive compounds derived from food sources that have beneficial health effect. Nutraceuticals is a multidisciplinary field

which encompasses biochemistry, biology, chemistry, pharmacy and nutrition. Nutraceuticals are being increasingly used along with the traditional medical therapy for ameliorating diseases. The term 'Nutraceuticals' encompasses terms such as food ingredients, and dietary supplements that provide specific health benefits. The ever-increasing spectra of nutraceuticals has created a huge opportunity to generate scientific knowledge which would in turn validate their efficacy.

The research center in Nutraceuticals has been established in the Department of Nutraceuticals, S K Somaiya College, Somaiya Vidyavihar University. The principal focus of the Ph.D. centre for Nutraceuticals is to develop techniques for extraction of nutraceuticals, and validation of their efficacy by both preclinical and clinical methods. Our mission is to compete with the best in this field by providing exceptional and interdisciplinary education and training in Nutraceuticals. We also aim to contribute immensely to the ever-growing research milieu. Academic year 2021-22 will mark the beginning of this course.

The Department of Nutraceuticals which was founded in the year 2010 has generated excellent human resources who are placed in premier institutes as scientists, educators and entrepreneurs in India as well as abroad. Faculty members of the department are working on several projects, prominent one is the project with Michigan State University, USA. The faculty members have published papers and book chapters of high impact factors. Students in the department are encouraged to participate at various competitive events. The department boosts of receiving internships for students at national level societies like Association of Food Scientists and Technologists among others.

KEY FEATURES

- Department with Ph.D. qualified faculty.
- Dynamic and interdisciplinary curriculum for in depth understanding of Nutraceuticals.
- Opportunities for collaborative research in India and abroad.
- Laboratory support for conducting interdisciplinary research projects.
- Workshops and Guest Lectures on a regular basis.
- A National-level annual event 'ANNAKOSH' organized by the students of the department.

Eligibility at UG/PG Degree	
Branch of study at UG	Life Sciences Biotechnology Microbiology Biochemistry Botany Zoology Food science and nutrition

Eligibility at UG/PG Degree	
Branch of study at PG	Nutraceuticals Life Sciences Biotechnology Microbiology Biochemistry Food science and nutrition Dietetics Bioanalytical sciences Botany Zoology

Syllabus for Entrance Examination

Unit 1:- Human Nutrition, Health and Interventions. Balanced diet-Food groups, Food pyramid. Macro and micronutrients in human nutrition-Carbohydrates, proteins, lipids, vitamins, minerals and water - requirements, sources, functions, metabolism and effects of deficiency and toxicity of the nutrients. Nutrients interrelationship. Inborn errors of metabolism. Phytochemicals, antioxidants, prebiotics and probiotics, functional foods and nutraceuticals. Drug and nutrient interaction. Diet & nutritional therapy in disorders of obesity, underweight, gastro-intestinal tract, kidney, liver, heart, lungs, cancer, diabetes mellitus, food allergies and intolerances. Major Public Health and Nutritional problems in India-Causes, magnitude and distribution. Assessment of Community Nutritional status by Standard methods. National Nutrition Policy, National and International organizations' programmes to combat malnutrition. Nutritional epidemiology, Public health aspects of human nutrition. Objectives, Principles and Importance of Nutrition education, Nutrition monitoring and Surveillance.

Unit 2:- Food Science and Processing Technologies Need & Scope of Food Science, Physico-chemical properties of foods, Methods of cooking-merits & demerits, factors affecting cooking. Sensory evaluation and Consumer acceptability, Food fortification, enrichment and supplementation. Food additives and Preservatives. Anti-nutritional factors & Toxicants in foods. Food hygiene and sanitation, Food-borne illnesses, infections and food poisoning. Food Adulteration, Food Standards, Laws & Regulations for food safety. Post-harvest losses, food spoilage and its causes. Food Processing techniques, effects on nutritional value, food packaging and labelling. Quantitative and Qualitative changes during post-harvest handling and processing of foods. Principles and methods of food processing, drying, concentration, freezing, cryogenic freezing fermentation, irradiation, canning, sterilization, pasteurization. Processing & packaging techniques for cereals, millets and legumes, milk and milk products, fruits and vegetables, nuts and oilseeds, meat, fish and poultry. Role of warehousing corporation and Food Corporation of India on post-harvest conservation. Storage of perishable and non-perishable foods, traditional and modern food storage

Unit 3:- Introduction to Nutraceuticals: Free radicals and antioxidants: The free radical or oxidant theory of disease, Mechanisms for limiting free radical damage, Diets associated

with reduced risk of chronic diseases, Evidence for benefit of antioxidant supplements, Vitamin E and dementia. Secondary plant metabolites, Terpenoids, Phenolic compounds (phenols and polyphenols), Nitrogen-containing alkaloids and sulphur-containing compounds, Lipids and lipid related functional foods. Mechanism of action of secondary metabolites in reducing risk of chronic diseases, Plant and animal extracts: Agnus castus, Aloe vera, Bee products, Chitosan, Echinacea, Garlic, Ginger, Ginkgo biloba, Ginseng, Guarana. Kelp, Milk thistle, Saw palmetto, Spirulina, Chlorella, St John's Wort, Tea extracts. Nature, functions, supplement forms and sources, rationale for use and evidence of effectiveness of Glucosamine and chondroitin sulphate, S-adenosylmethionine, Lecithin and choline, L-carnitine, Creatine Coenzyme Q10 (ubiquinone), α-Lipoic acid, Methylsulphonylmethane.

Unit 4: - Techniques of cellular fractionation, Extraction procedures, Batch extraction, continuous extraction and counter current extraction. Centrifuge techniques: zonal, density, gradient and ultracentrifugation techniques and their applications. Electrophoresis: zonal, paper, gel electrophoresis and isoelectric focusing and their application. Thermal method of analysis. Chromatography: Paper, TLC, adsorption, ion exchange, gel filtration, affinity, GC & HPLC. Spectroscopy: Beer-Lambert law & brief description of colorimetry, UV–VIS, Fluorescence, Infrared spectroscopy, Raman Spectroscopy, NMR, Mass spectroscopy, Flame photometry, Atomic absorption spectroscopy and X-ray diffraction, ICP MS, ICP AES, General idea about hyphenated techniques in chromatography.

Polymer Science

About Research Center

Polymer Science is a broad discipline which mainly focuses on developing new sustainable polymers including developing new materials from renewable sources by new polymer chemistry, new methods to recycle plastics, and energy-efficient way to process polymeric materials with a lower carbon footprint. A revolution has taken place over the last 50 years in the field of synthetic polymers, whose applications have rapidly permeated most aspects of our daily lives.

The research centre in Polymer Science has been established in the Department of Polymer Science, S K Somaiya College, Somaiya Vidyavihar University. The main goal of the Ph.D. centre of Polymer Science is to promote world-class education, training, and innovative research at the convergence of several disciplines, covering both basic and applied research problems, applications of polymer. The Ph.D Research programme has started from the academic year 2020-21.

Faculty members also work with scientists from National Institutes in India and around the world. Their research component strengthens and enriches the teaching program even more. The Faculty members have good publication records in journals with significant impact factors.

At present, we have Ph.D. guides with expertise in polymer recycling, polymer coating, biomaterials, organic electronics and energy, high performance polymer, polymer nanocomposites, and synthetic methodology for polymer. The Department of Polymer Science has a fully equipped specialized laboratory for research students. Furthermore, the Department of Polymer Science has its own library with open access to research papers for download. MoUs are under discussion with several other national and international academic institutions as well as polymer industries.The Department of Polymer Science also encourages students to promote their work at various competitive events such as AVISHKAR, National, and International conferences for oral and poster presentations.

KEY FEATURES
- State-of-the-art laboratories
- Department with Ph.D.-qualified faculty
- Aim for Research-driven opportunities in Institutions in India and abroad.
- Wide range of program and open electives
- Opportunity for students to carry out interdisciplinary research projects across current   relevant topic in polymer etc.
- Workshops and Guest Lectures on a regular basis

Eligibility at UG/PG Degree	
Branch of study at UG	Bachelor of Science degree in Chemistry/Polymer science/Polymer chemistry/Physics/Geology/Life Sciences/Biotechnology or Bachelor of Technology / Engineering
Branch of study at PG	Masters of Science / Technology/ Engineering degree in any branch of Chemistry/Polymer Chemistry/ Polymer Science/ Paints/ Surface Coating / Rubbers/Elastomers/ Textiles /Fibre Science/ Material science/ Materials science and Engineering .

Syllabus for Entrance Examination

Introduction and Nomenclature:
Functionality of monomers and its role in deciding polymers structure (linear, branched and cross-linked); IUPAC names, trade or commercial names, source based and structure based names of various polymers, classification of polymers, different copolymers, random, alternating, azeotropic copolymerization, block and graft copolymers, geometry and stereoregularity of polymers.

Methods of Polymerization:
Bulk, solution, suspension, emulsion, solid phase, gas phase, ring opening, melt condensation, solution condensation and plasma polymerization, addition polymerization, metathesis polymerization, interfacial condensation, electrochemical polymerization, group-transfer polymerization.

Polymer Characterization:
Analysis of polymers- Chemical (elemental), Flame test, Color and solubility test., Number and weight average molecular weights and their determinations, Thermal behavior and analysis (DTA, DSC, TGA, TMA) of polymers, applications of these techniques, Viscoelastic behavior of polymers, factors affecting viscoelastic behavior, applications and measurement of viscoelastic properties (by DMA), Spectroscopic methods (UV-Vis, IR, NMR).

Processing of polymers:
Processing of plastics, elastomers, fibers, paints and varnishes, compounding, extrusion techniques and processes based on extrusion, injection moulding and processes based on injection moulding, compression moulding and transfer moulding.

Additives for polymers:
Initiator, Inhibitor, Retarder, Plasticizer, Heat stabilizers, Lubricants, UV-stabilizers, Pigments and Extenders, Flame retardants and blowing agents.

Synthesis and properties of thermoplastics:
Commodity and general-purpose thermoplastics: PE, PP, PS, PVC, Polyesters, PU polymers. Engineering Plastics: Nylon, PC, ABS, and Fluoro polymers
Synthesis and properties of thermosetting polymers:
PF, MF, UF, Epoxy, Unsaturated polyester.

Mathematics

About Research Center

Mathematics is a broad discipline in which calculus, algebra, analysis, number theory etc. are studied to derive new functions, properties and results. These results are used in different fields of science, technologies, economics etc. The research centre in Mathematics has been established in the Department of Mathematics, S K Somaiya College, Somaiya Vidyavihar University. The primary focus of the Ph.D. centre for Mathematics is to provide world class education, training and conduct innovative research at the interface of multiple disciplines to create high quality

human resource in disciplinary and interdisciplinary areas of Mathematics in a globally competitive research milieu. Both basic and applied research topics will be addressed in this research centre. The Ph.D Research programme is starting from the academic year 2022-23. Faculty members also collaborate with experts from National Institutes of India and abroad. Their research component further strengthens & enriches the teaching programme. Faculty members of the research centre have an excellent track record of research in various areas of Mathematics. The Faculty members have excellent records of publication in journals with high impact factors like Springer, Elsevier etc. Faculty member have presented several papers in reputed national and international peer reviewed conferences. Faculty member also possesses number of recognized awards from renowned organizations of the globe.

KEY FEATURES

• Department with Ph.D.-qualified faculty

• Dynamic curriculum • Aim for Research-driven opportunities in Institutions in India and   abroad

• Wide range of program and open electives

• Opportunity for students to carry out inter-disciplinary research projects

• Workshops and Guest Lectures on a regular basis

Eligibility at UG/PG Degree	
Branch of study at UG	Mathematics Statistics Physics
Branch of study at PG	Mathematics Statistics

Syllabus for Entrance Examination
Analysis: Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem, Limits , Continuity, uniform continuity, differentiability, mean value theorem, Sequences and series of functions, convergence, uniform convergence, Weierstrass approximation theorem, Riemann sums and Riemann integral, Improper Integrals, Monotonic functions, types of discontinuity, functions of bounded variation, contraction mapping principle, Inverse and Implicit function theorems, Lebesgue measure, measurable functions Lebesgue integral, Functions of several variables, directional derivative, partial derivative, total Derivative, maxima and minima, saddle point, method of Lagrange's multipliers; derivative as a linear transformation, Metric spaces, compactness, connectedness, Normed Linear Spaces, Spaces of Continuous functions, Fatou's lemma, monotone convergence theorem, dominated convergence theorem, Double and Triple integrals and their

applications; Line integrals and Surface integrals, Green's theorem, Stokes' theorem, and Gauss divergence theorem.

Complex Analysis: Algebra of complex numbers, Analytic functions, Harmonic Functions, Cauchy-Riemann equations, Contour integral, line integrals, Cauchy's Theorem and integral formula, Morera's theorem, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem, Power series, Taylor's and Laurent's series, Classification of zeros & singularities, Radius of Convergence, Residues, Contour integration, Riemann Sphere and Stereographic projection, Conformal mapping, Mobius transformations.

Linear Algebra: Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations & their matrix representations, Algebra of matrices, rank and determinant of matrices, rank & nullity, systems of linear equations, Eigenvalues and eigenvectors, Cayley-Hamilton theorem, minimal polynomial, diagonalization, Jordan canonical form, symmetric, skew-symmetric, Hermitian, skew-Hermitian, orthogonal and unitary matrices; Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms, Finite dimensional inner product spaces, Gram-Schmidt orthonormalization process, definite forms, Inner product spaces, orthonormal basis, Quadratic forms, reduction and classification of quadratic forms.

Algebra: Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle, derangements, Fundamental theorem of arithmetic, divisibility in Z, congruence, Chinese Remainder Theorem, Euler's $\emptyset$- function, primitive roots, Groups, subgroups, normal subgroups, quotient groups, homomorphisms, automorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems and their applications, Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain, Polynomial rings and irreducibility criteria, Fields, finite fields, field extensions.

Ordinary Differential Equations (ODEs): First order ordinary differential equations, existence and uniqueness theorems for initial value problems, singular solutions of first order ODEs, system of first order ODEs, linear ordinary differential equations of higher order with constant coefficients; Second order linear ordinary differential equations with variable coefficients; Cauchy-Euler equation, method of Laplace transforms for solving ordinary differential equations, series solutions (power series, Frobenius method); Legendre and Bessel functions and their orthogonal properties; Systems of linear first order ordinary differential equations, General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Green's function.

Partial Differential Equations (PDEs): Linear and quasi-linear first order partial differential equations, Lagrange and Charpit methods for solving first order PDEs, method of characteristics; Second order linear equations in two variables and their classification; General solution of higher order PDEs with constant coefficients, Cauchy, Dirichlet and Neumann problems; Solutions of Laplace and wave equations in two dimensional Cartesian coordinates, interior and exterior Dirichlet problems in polar

coordinates; Separation of variables method for Laplace, heat & wave and diffusion equations; Fourier series and Fourier transform and Laplace transform methods of solutions for the equations mentioned above.

Numerical Analysis: Numerical solutions of algebraic equations and transcendental equations: bisection, secant method, Newton-Raphson method, fixed point iteration, Method of iteration, Rate of convergence, Numerical solution of a system of linear equations: direct methods (Gauss elimination, LU decomposition), iterative methods (Jacobi and Gauss-Seidel); Numerical solution of initial value problems of ODEs: Euler's method, Runge-Kutta methods of order 2, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods, Finite differences, Interpolation: error of polynomial interpolation, Lagrange, Newton, Hermite and spline interpolation, Numerical differentiation and Numerical integration: Trapezoidal and Simpson's rules.

Linear Programming: Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, two phase methods; infeasible and unbounded LPP's, alternate optima; Dual problem and duality theorems; Balanced and unbalanced transportation problems, Vogel's approximation method for solving transportation problems; Hungarian method for solving assignment problems.

Integral Transform: Laplace transform; Transform of elementary functions, Transform of Derivatives, Inverse Transform, Convolution Theorem, Applications, Ordinary and Partial differential equations; Fourier transform; sine and cosine transform, Inverse Fourier Transform, Application to ordinary and partial differential equations.

Discrete Mathematics: Partially ordered sets, Lattices, Complete Lattices, Distributive lattices, Complements, Boolean Algebra, Boolean Expressions, Application to switching circuits, Elements of Graph Theory, Eulerian and Hamiltonian graphs, planar Graphs, Directed Graphs, Trees, Permutations and Combinations, Pigeonhole principle, principle of Inclusion and Exclusion, Derangements.

Faculty of Sciences
(Somaiya Institute for Research & Consultancy)

Subjects Offered:

- Life Science
- Physics
- Chemistry

Life Science

About Research Center

Doctoral programme of Life Sciences at Somaiya Vidyavihar University will cater to research scholars who are keen to think and achieve beyond 'just science.' With our exclusive joint mentorship, life science students can pursue an interdisciplinary research solution through co-mentors from Engineering, Technology, Management, Humanities or Education providing a plethora of research possibilities. This opens collaborative opportunities in developing assistive technology, bio-imaging, natural resource management, biosensors, , bio-entrepreneurship, agritechnology, sustainable development and many more. We encourage scholars to develop sustainable solutions to indigenous issues & problems to deliver local, national and global impact.

a) Gut microbiome and beta-amyloid peptide in the human body may have a significant impact on the brain pathology which is consistent with the neuropathogenesis of Alzheimer's disease (AD). Dietary poly(phenols) in the form of phlorotannins (100 kDa to 126 kDa) from brown macroalgae undergo biotransformation by gut microbiota to obtain metabolites active in brain and could directly act as neurotransmitters crossing the blood-brain barrier (BBB). They are strong antioxidant compounds and can enhance the neuroprotection against the inflammation of the brain. Two marine phlorotannins (dieckol and 8,8'-bieckol) from Ecklonia cava macroalgae effectively penetrated into the brain through the BBB with low oral bioavailability. In the human body, they are transformed by gut microbiota and are well absorbed in the intestine and persist in the plasma for a substantial time which can be an effective prevention and treatment approach for neurodegenerative diseases (NDs).Low-molecular weight (LMW) (poly)phenols have attenuated neuroinflammation in stimulated microglia cells. Phlorotannins also chelate metals and scavenge free radicals in the intracellular environment. They

may also inhibit acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) for the management of Alzheimer's disease (AD).With this
multitargeted approach, the objective of this study is to investigate the nutritional phlorotannins as viable neuroprotective agents against inflammation, cholinergic enzymes and metal chelation potential in AD.The BBB permeability of these metabolites will be checked on $CaCO_2$ intestinal epithelial cells, as it gives best correlation with in vivo data.

The project is funded under Science and Engineering Research Board (SERB)- POWER Grant by the Department of Science & Technology (DST), Govt of India, with the aim to encourage emerging and eminent women researchers for individual-centric and competitive mode of research funding.

b) Many primary brain tumors are intrinsically chemoresistant; limited penetration of cytotoxic drugs across the blood–brain barrier (BBB) may also contribute to the poor response of brain tumors to chemotherapy. Brain metastases respond poorly to chemotherapy, which may be due to differences in chemosensitivity between primary and metastatic tumors in metastases of previously treated tumors, clonal selection of chemoresistant tumor cells might have already took place. In this direction from our library of the molecules we have three hit molecules which are acridone based derivatives namely AC2, AC7 and AC26 (Preliminary patents filed). These molecules have been designed with a lot of scientific rationale from the previous studies and also from the literature like molecular and functional group spacing one more important criteria has been emphasised is lipophilicity as these molecules will be used in glioma, these molecules should have the capability to cross the blood brain barrier. Preliminary studies by in vitro SRB assay, show potent cytotoxicity not only against sensitive glioma cell lines but also in resistant glioma cell lines 100 times better than temozolomide, the only drug of choice used in glioma. These compounds are the outcome of previously funded SERB project SR/FT/LS-186/2009. From our preliminary results we came to know that the drugs AC2, AC7 and AC26 (Patents Published, 201822004910 dated 09-02-2018) are showing cytotoxicity of more than 100 times compared to Temozolomide and these molecule really deserve further studies as they have the potential of being potent molecules in the treatment of Brain cancer. We carry out cytotoxicity assay by SRB on various sensitive and resistant glioma cell lines, along with various mechanistic studies by established procedures. And finally the tumour model assays in mice and imaging assays will give the in vivo correlation with in vitro studies carried out in the lab.

The project is funded by the Science and Engineering Research Board (SERB)-CRG scheme by the Department of Science & Technology (DST), Govt of India.

Eligibility at UG/PG Degree	
Branch of study at UG (4 Year degree with 75% or 7.5 CGPA)	Life Sciences B.Tech in Biotechnology/ Bioinformatics B.Pharmacy Bachelor of Dental Surgery BSc Nursing Bachelor of Physiotherapy & allied courses MBBS and allied science discipline
Branch of study at PG	M.Tech in Biotechnology /Bioinformatics MSc in Biotechnology/ Bioinformatics M.Pharmacy Environmental Sciences and any allied sciences

Syllabus for Entrance Examination
CSIR – NET/JRF syllabus 2022 for Life Sciences

Physics

About Research Center

The research centre in Physics has been established in the Department of Physics, S K Somaiya College, Somaiya Vidyavihar University. The primary focus of the Ph.D. centre for Physics is to provide world class education, training and conduct innovative research at the interface of multiple disciplines to create high quality human resource in disciplinary and interdisciplinary areas of Physics in a globally competitive research milieu. Both basic and applied research topics will be addressed. The Ph.D Research programme has started from the academic year 2020-21.

Faculty members also collaborate with scientists from National Institutes in India and abroad. Their research components further strengthens & enrich the teaching programme. Owing to the best academic practices for the teaching programme, this Department has been able to generate excellent human resources in Physics.

The department has an excellent track record of research in various areas of Physics with exposure to various themes. The Faculty members have excellent records of publication in journals with high impact factors. At present, we have Ph.D. guide with expertise in Nanoscience and nanotechnology, Materials Science, Photovoltaics and Solar Cells. Since several years many of the alumni of the Department are well placed in various premier Institutions/Industries as teachers & entrepreneurs in various parts of the country and abroad. The department has several MoUs with organisations of national and international repute.

Students who study physics or engineering physics are prepared to work on forefront ideas in science and technology, in academia, the government, or the private sector. Careers might focus on basic research in Atomic physics, photonics or condensed matter physics. It also include teaching, medicine, law (especially intellectual property or patent law), science writing, history of science, philosophy of science, science policy, energy policy, government, or management in technical fields.

KEY FEATURES

- State-of-the-art laboratories
- Department with Ph.D.-qualified faculty
- Dynamic curriculum with right mix of various fields of Physical sciences
- Research-driven opportunities in Institutions in India and abroad
- Wide range of program and choice of open electives
- Opportunity for students to carry out inter-disciplinary research projects
- Workshops and Guest Lectures on a regular basis

Eligibility at UG/PG Degree	
Branch of study at UG	Physics Electronics Maths Chemistry
Branch of study at PG	Physics Electronics Applied Physics Materials Science

Syllabus for Entrance Examination

Mathematical Physics:
Vector algebra, Vector calculus, Linear algebra, matrices, linear differential equations, elements of complex analysis: Cauchy-Riemann conditions, Cauchy's theorems, singularities, residue theorem and applications; Fourier and Laplace transforms, elementary ideas about tensors.

Classical Mechanics:
Newton's laws, D'Alembert's principle, cyclic coordinates, variational principle, Lagrange's equation of motion, central force and scattering problems, rigid body motion; small oscillations, Hamilton's formalisms; Poisson bracket; special theory of relativity: Lorentz transformations, relativistic kinematics, mass-energy equivalence.

Electromagnetic Theory:
Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at

interfaces. Scalar and vector fields and potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, interference, coherence, and diffraction.

Quantum Mechanics:
Wave-particle duality, de-Broglie's hypothesis and its experiential verification, Postulates of quantum mechanics; uncertainty principle; phase velocity and group velocity of matter waves; Schrodinger time dependent and time independent wave equation; potential problems in one-, two- and three-dimensional, particle in infinite potential well, harmonic oscillator, hydrogen atom.

Thermodynamics and Statistical Physics:
Laws of thermodynamics; Maxwell's fundamentals thermodynamic relations, phase space; ensembles; partition function, Free energy and its connection with thermodynamic quantities, calculation of thermodynamic quantities; classical and quantum statistics; degenerate Fermi gas; Planck's radiation formula, black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions.

Atomic and Molecular Physics:
Quantum states of an electron in an atom, Electron spin, Spectrum of helium and alkali atom. Energy levels of hydrogen atom, Zeeman and Stark effects; electric dipole transitions and selection rules; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Raman effect; NMR, ESR, X-ray; He-Ne and NdYaG LASERs: Einstein coefficients, Optical pumping, population inversion, two and three level systems.

Solid State Physics & Electronics:
Elements of crystallography; diffraction methods for structure determination; bonding in solids; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids: Fermi level, nearly free electron and tight binding models; metals, semiconductors and insulators; conductivity, mobility and effective mass; optical, Hall effect, dielectric and magnetic properties of solids; elements of superconductivity: Type-I and Type II superconductors, Meissner effect, Liquid Crystals.
Semiconductor devices: diodes, Bipolar Junction Transistors, Field Effect Transistors; operational amplifiers: regulated power supplies; basic digital logic circuits, sequential circuits, flip-flops, counters, registers, A/D and D/A conversion.

Chemistry

About Research Center

Research Centre in Chemistry presently nested under the Department of Polymer Science. Our centre's current focuses are Computational chemistry and Electron induced chemistry.

Computational Chemistry

During the past few decades, the world has witnessed myriads of novel materials that have been (and are being) discovered or synthesized. We have the experience and expertise that we could inculcate over the past years, become indispensably relevant for investigation on materials. This experience has enabled us to gain, develop and further hone our expertise in some fascinating and diversified domains computational and quantum chemical simulations in catalysis, reactions at interfaces, hydrogen-storage materials, hydrogen bonded clusters, while enriching our knowledge-base in basic science.

The relevance is that a quantum chemical investigation simulates at the molecular level a material and brings out its finer nuances in characteristics and its reactivity.

A computer 'experiment' (an 'in silico' simulation) can therefore leads us to pre-emptive determination of properties and descriptors and gauges its role by predicting its properties, prior to actually doing an experiment in the laboratory. This would provide enormous impetus for characterizing different materials in silico enabling one to glean out pointers through which one could converge on what experiments actually, i.e. in vitro or in situ could be carried out. The computer simulations therefore play a dual role: give proper directions and eliminate, pre-emptively, irrelevant materials. Thus, it is no wonder that the field of 'Computational and Quantum Chemistry' has now become extremely crucial in handling the challenges of modern times, both in academia and in industry.

A brief outline of the research-topics that our center pursues are given below.

A) Computational and Quantum Chemical Modeling

1. Novel solar photocatalysts for hydrogen generation
    Solar photocatalysts have attracted the attention of the researchers for more than past decades or so as they provide the economic and easy route to generate H_2 energy by water and H_2S splitting.
    Objectives
    The proposed research project is aimed at development, physicochemical characterization followed by the testing and validation of the better solar photo-catalyst for hydrogen generation employing computational simulations and experimental approach (collaboration with Centre for Materials and Electronics Technology, Pune, India).
2. Molecular Clusters, Organic reaction mechanism and catalysis
    Objectives
    Ab initio quantum chemical and density functional theory (DFT) framework is aimed at providing the guidelines for efficient and accurate modeling of a) molecular clusters, b) heterogeneous catalysts, as well as c) various organic reactions as well as compliment the experiments.

Our center is having ongoing collaborations with Professor Libero J. Bartolotti (East Carolina University, Greenville, NC, USA) and Professor Shridhar R. Gadre (S. P. Pune University, Pune, India).

B) Electron Induced Chemistry

Electron induced chemistry plays a major role in a variety of natural phenomena starting from interstellar medium and planetary atmospheres to radiation biology due to their ubiquitous presence. They also play a primary role in all of plasma chemistry leading to a wide variety of practical applications and nanolithography which is a high profile industrial application. The end result of all high energy radiation in matter is the production of large number of low energy (< 20 eV) electrons with their increased chemical activity of selectively binding to molecules forming excited states of molecular negative ions which decay producing very reactive species like radicals and negative ions (dissociation channel called Dissociative Electron Attachment) or vibronically excited molecules (electron detachment channel). While the realization that low energy electrons are efficient agents of chemical transformation is relatively recent, that these electrons can be used as a tool to control chemical reactions at the single molecule level, in gas phase, and in condensed phase based on their attachment properties to molecules forming negative ion complexes is more recent. This evolving area of chemical control using electrons has become more fascinating after it was proposed recently by us that a low energy electron can be used as a catalyst for selective multi-bond breaking reactions. Since then we have been pursuing this activity and have succeeded in demonstrating catalytic action of electrons. This is a developing area of research and very little is being done in India. Our aim is to develop and establish a group actively pursuing the study of electron induced chemical reactions relevant to natural phenomena (e.g. chemistry on the interstellar grains) as well as practical applications (e.g. radiation biology, pollution control) and their possible control.

1. Electron induced chemical processes
   We study electron attachments states or negative ion resonance states (NIRs) and reaction pathways theoretically using ab initio quantum chemical methods.
   We also do studies of free electron induced chemical syntheses by doing electron collision experiments on different types of simple & complex molecules and also on mixtures of compounds. This also includes study of different classical reaction mechanisms; e.g. eliminations, rearrangements etc. by free electron to understand the difference.
   This project is in Collaboration with Bhabha Atomic Research Centre, Mumbai.

2. Low energy electron induced light repair of DNA
   In this work, we aim to concentrate on the studies mainly on biological molecules like DNA bases and their dimers, amino acids etc. The main interest in this is the DNA damage and repair by low energy free electrons (LEFE). DNA bases pyrimidines can get damaged by UV photons and form cyclobutane dimers and these are the cause of skin cancers in humans. Some organisms are capable of repairing these damaged dimer sites using another UV photon with the help of electron transfer. We will study this pyrimidine damage and repair by free electrons.
   This Project is also in Collaboration with Bhabha Atomic Research Centre (BARC), Mumbai.
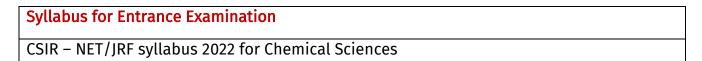
3. Astrochemistry

The objective here is the study of chemical synthesis in interstellar medium (ISM) by simulating the environment of astrochemical conditions. The temperature in ISM environment is nearly 10-20 K. We can achieve this temperature through a cold head. It is proposed that the synthesis in the ISM environment mostly happened in dust grains at these lower temperatures. It has been noted that ubiquitous low energy secondary electrons in the ISM environment can also contribute to these synthesis. With our cold condensed phase electron collision apparatus, we will be able to simulate this environment and deposit the sample for electron irradiation in that environment. In this set of study, we concentrate on astrochemically important molecules such as glycine, polyaromatic hydrocarbons (anthracene), glycolaldehye etc.

This project is in collaboration with Tata Institute of Fundamental Research, Mumbai

Development of computational simulation laboratory

Investigations on all the above projects require a high-performance computational facility. We are in a process to develop the high performance computational (HPC) facilities in the Chemistry Research centre

Eligibility at UG/PG Degree	
Branch of study at UG	Chemistry Polymer Chemistry Biochemistry Environmental Chemistry
Branch of study at PG	Chemistry Physical Chemistry Organic Chemistry Inorganic Chemistry Analytical Chemistry Polymer Chemistry Applied Chemistry Chemical Technology Hydrochemistry Biochemistry Environmental Chemistry

Syllabus for Entrance Examination
CSIR – NET/JRF syllabus 2022 for Chemical Sciences

Faculty of Sciences
(Somaiya Sports Academy)

Subjects Offered:

- Sports and Exercise Science
- Physical Education in sports
- History and origin of physical education and Olympic games
- Multidisciplinary research in physical education and sports sciences

About Research Center

Centre for Sports Sciences and Research at Somaiya sports Academy
Sport science is a multidisciplinary field concurred with the understanding and enhancement of human sporting performance. Sport science can be thought of as a scientific process used to guide the practice of sport with the ultimate aim of improving sporting performance.
It is about using the best available evidence at the right time, in the right environment, for the right individual to improve their performance. In order to achieve performance in sports, findings of research play an indispensable role, it is necessary to use the findings of well-designed research studies and to translate them into everyday practice. In order to achieve at least some of these goals, Somaiya sports Academy proposed to establish a research center at
Somaiya sports academy.

Eligibility at UG/PG Degree	
Branch of study at UG	Sports or Physical Education
Branch of study at PG	Sports or Physical Education

Syllabus for Entrance Examination
Research Methodology

Research Methodology

1. Fundamentals of Research

- Meaning, Nature, Characteristics, Need and Scope of research in the field of sports and exercise science/ Physical Education.

- Distinction between Research, Invention and Discovery

- Scientific inquiry and theory development

- Source of knowledge

- Interdisciplinary in research : need and importance

2. Types and Methods of Educational Research

a) Types: Fundamental, Applied, Action research

b) Research Methods:

- Historical: Sources of data, internal and external validity

- Descriptive: Surveys, Case Study, developmental, co- relational & ex-post-facto research

- Experimental: research designs - pre, quasi and true experimental research, internal and external validity of the experiment

- Multimethod Research

c) Qualitative Research : Need and importance, Characteristics, Difference between Qualitative and Quantitative Research

3. Research Problem, Variables, Hypothesis Population and Sampling

a) Selection and finalization of research problem, Operational/ dictionary/conceptual definitions

b) Review of related literature Sources (Data Bases) Searching (Use of technology) Review writing

c) Variables: Concept, Nature, Characteristics and Types

d) Hypothesis: Concept, Characteristics and Forms, hypothesis testing

e) Assumptions: Meaning and Role

f) Population: Concept

g) Sampling and Sample: Need of Sampling, Probability and non-Probability

h) based sampling, characteristics of good sample, errors in sampling

4. Data Collection tools/techniques:

a) Questionnaire

b) Interview

c) Observation

d) Psychological tests

e) e-tools Qualities of good data collection tools.

5. Data Analysis and interpretation

a) Scales of Measurement

b) Measures of central tendency and variability

c) Measures of relative positions: Deciles, Percentiles, Percentile rank and standard scores

d) Correlation - Concept, types and uses

e) Concepts of: Parameter and statistic, Type I and Type II errors, Degrees of Freedom, Confidence limits & intervals, Parametric and non-Parametric tests

f) t- test, F test, Chi-Square test

6. Report writing

a) Format of research report

b) Characteristics of good research report

c) Research ethics

d) Plagiarism, Citation guidelines

e) Use of computers in various phases of research

<u>Subject Concerned Syllabus Sports and exercise science, Physical Education</u>

Unit-1 Foundation of Physical Education

• Introduction to and definition, aims and objectives of Physical Education

• Philosophical basis of Physical Education

• Psychological basis of physical Education-Play and Play theories

• General principles of growth and development, Principles of motor skill acquisition, transfer of training effects.

• Sociological basis of physical Education-socialization process, social nature of men and physical activity, traditions and sport, competition and cooperation

• Olympic Movement-and its impact

• Professional preparation in Physical Education in India,

•development of teacher education in Physical Education, Professional Ethics,

•Qualities and Qualifications of Physical Educational Personnel

• Principles of curriculum planning, Age characteristics of pupils and selection of activities.

• Construction of class and school physical Education time table.

• Learning process - theories and laws of learning, Motivation, theories and dynamics of motivation in sports,

• Psychological factors affecting sports performance-viz. stress, anxiety, tension and aggression.

• Personality, its dimensions, theories, personality and performance

• Individual differences and their impact on skill learning and performance

• Group dynamics, team cohesion and leadership in sports

• Sociometric, economics and politics in sports

Unit-2 Scientific Basis of Physical Education

• Physiology of muscular activity, Neurotransmission; Movement mechanism

• Physiology of respiration

• Physiology of blood circulation

• Factors influencing performance in sports

• Bioenergetics and recovery process

• Health-Guiding principles of health and health education

• Nutrition and dietary manipulations

• Health-related fitness, obesity and its management

• Environmental and occupational hazards and first aid

• Communicable diseases-their preventive and therapeutic aspects

• School health program and personal hygiene

• Theories and principles of recreation.

• Recreation program for various categories of people

Unit—3 Fitness & Sports Training

• Characteristics and principles of sports training

• Training load and periodization – short term & long term plan

• Training methods and Designing training program for development of various motor qualities.

• Training cycles (Micro, Meso; Macro cycles)

• Technical and Tactical preparation for sports.

• Sports talent identification process and procedures

• Preparing for competition-build up competitions, main competition,

• competition frequency, Psychological preparation.

• Biological basis of physical activity-benefits of exercise, growth and exercise, exercise and well-being sex and age characteristics of adolescent. body types

• Basic Principles of Physical Fitness

• Benefits of aerobic exercises, monitoring heart rate, Developing aerobic exercise program- setting goals, applying FITT, building & maintaining aerobic fitness,

• Benefits of muscular strength; endurance, assessing muscular strength & endurance, creating a successful strength training program,

• Applying FITT principle, weight machines versus free weights, weight training safety,

• Determinants of flexibility, benefits; additional potential benefits of flexibility & stretching exercises, Flexibility improvement- FITT principle

Unit-4 Biomechanics, Athletic care & Rehabilitation

- Joints and their movements-planes and axes

- Kinetics, Kinematics-linear and angular, levers

- Laws of motion, principles of equilibrium, force, spin and elasticity

- Muscular analysis of Motor movement

- Mechanical analysis of various sports activities

- Mechanical analysis of fundamental movements- running, jumping, throwing, pulling and pushing

- Athletic injuries-their management and rehabilitation

- Therapeutic modalities and exercise

- Ergogenic aids and doping

- Posture – Postural Deformities

Unit—5 Research , Statistics, Evaluation; Management of Physical Education & Sports

- Nature, scope and type of research , ethical consideration in research

- Formulation and selection of research problems.

- Sampling-process and techniques.

- Methods of research.

- Data collection-tools and techniques.

- Statistical techniques of data analysis-measures of central tendency and variability correlation, normal probability curve, t-test and chi square, ANOVA

- Hypothesis-formulation, types and testing of null hypothesis

- Concept of test, measurement ,Evaluation; Assessment

- Basic Approaches and Principles of measurement and evaluation

- Construction of knowledge test and Psychomotor test

- Criteria of test selection

- Concepts and assessment of physical fitness, motor fitness, motor ability and

motor

educability and skill tests (Basket Ball, Soccer, Volleyball, Badminton, Tennis)

• Measurement of Affective Behavior: Likert Scale, Rating Scale and Questionnaire

• Psychological measurement in sports and Exercise -competitive

anxiety, aggression, team cohesion motivation, self-concept.

• Anthropometric measurements and body composition.

• Concept and principles of management

• Management of infrastructure, equipment's, finance and personnel. Media & Sports

• Instructional Process in Physical Education – essential elements, optimizing

• learning, effectiveness, class management, methods & techniques of teaching

Unit—6 Yoga, recreation, pedagogy, adapted physical education

• Meaning, definition, need & importance of yoga , Historical background of yoga,

types of yoga, Ashtanga Yoga (Eight stages of yoga), Chitta Vrtti (Causes for the

modification of the mind), Chitta Viksepa (Directions & obstacles)

• Meaning & definition of Asanas, Pranayam, Bandha, & Kriya, Types of Asanas,

Pranayama, Bandha, & Kriya, Need & importance of Asanas, Pranayam, Bandha, &

Kriya ,Benefits & effects of Asanas, Pranayam, Bandha, & Kriya

• Purpose, Aims and Objectives of Adapted Physical Education and Sports, Adapted

Sports- Para Olympics

• Behavioral and Special learning disability, Visual Impaired and Deafness, Health

Impaired students and Physical Education, HRPF and its development for Individual

with unique need

• Stages of skill development in teaching, sources of help, expert PE teacher,

Effective teacher- Active teachers, contextual variations of active teaching

• Spectrum of teaching styles, Managing behavior & misbehavior, discipline, Developmental analysis, planning for instruction

• Technology in Physical Education, Domains of Physical Education, Curriculum in Physical Education

• Generic instructional strategies- guided practice, independent practice, monitoring student performance, Instructional format active teaching, task teaching, teaching through questioning, peer teaching, cooperative learning

• Traditional methods for assessing teaching- intuitive judgment, eyeballing, anecdotal records, checklists, rating scale, Systematic observation records- event recording, duration recording, interval recording, group time sampling, self-recording.

Unit-7. Health Education and Sports Nutrition

1. Definition of Health, Health Education and Description of its components.

2. Health Problems in India (Communicable and Non Communicable Diseases, Nutritional Diseases, and Environmental Diseases)

3. School Health Services

4. Nutrition, Assessment of Nutrition,

5. Classification of Food, Balance Diet.

Macronutrients – Carbohydrate, Protein and Fat, Micronutrients – Vitamins and Minerals, Water, Electrolytes, and Fluid Balance, Balanced Diet, Ergogenic Aids, Factors Affecting Nutrition Needs, Nutrition Plans - Sports Specific, Athlete Specific, Gender Specific, Age Specific, Eating Disorders in Athletes, Weight Management, Fueling Before, During and After Exercise.

Unit-8. Anatomy, Physiology and Physiology of Exercise

1. Cell, Tissues, Organs and Systems-Structure and Function

2. Bio-Electric Potential.

3. Study of following systems and processes with a view to understand the effect of

exercise on Different systems of the Body.

3.1 Cardio-Vascular System

3.2 Respiratory System

3.3 Nervous System

3.4 Metabolism and Temperature Regulation

3.5 Muscular System.

Anatomical Positions and Movements, Structure and Function of Cell, Cardiovascular System -The Heart, Vascular System, Blood,

Respiratory System - Pulmonary Ventilation, Pulmonary Volumes, Pulmonary Diffusion, Transport of Oxygen and Carbon Dioxide in the Blood, Gas Exchange, Musculoskeletal System–Properties of Muscles, Types of Muscles and Bones, Anatomy of Skeletal Muscle, Tendons, Muscle Fiber Contraction, Muscle Fiber Types, Endocrine System- Endocrine Glands and Their Hormones, Neuromuscular System - Structure and Function of the Nervous System, Central Nervous System, Peripheral Nervous System, Neuromuscular Junction, Bioenergetics and Muscle Metabolism – Glycolysis, Kerb Cycle and Electron Transport Chain, Fatigue, Muscle Soreness and Recovery, Effect of Exercise on Body Systems.

Unit-9. Educational Methods and Educational Technology

1. Teaching Technique in Education.

2. Principles of Teaching, Commands and Class Management

3. Lesson Planning- Physical Education and Coaching Lessons

4. Tournaments-Knockout, League, Combination and Challenge types.

5. Audio-Visual aids-values, criteria for selection and suggestion for use.

6. Presentation Techniques in Physical Education.

7. Micro Teaching, Simulation Teaching.

Unit-10. Educational Psychology

1. Development Psychology (Heredity and Environment, Stages of Growth and Development , Individual Differences)

2. Learning Processes (Theories of learning (Trial and Error, Conditioned

Response and Learning by Insight), Laws of Learning (Law of readiness, Exercise , effect)

3. Transfer of Learning and Learning Curve ,Memory & Types of Memory

4. Personality (Meaning & Nature)

5. Motivation and Emotion

Learning Process and Theories of Learning, Personality and Sports, Personality

Theories, Motivation – Approaches, Theories, Achievement Motivation and

Competitiveness, Feedback, Reinforcement, and Intrinsic Motivation, Arousal, Stress,

and Anxiety, Diversity and Inclusion, Team Dynamics and Cohesion, Leadership and

Communication, Imagery, Self-confidence, Goal Setting, Aggression, Concentration

Unit-11. Kinesiology and Corrective Physical Education

1. Types of Joints & Muscles.

2. Major Terminologies of Fundamental Movements.

3. Location and Action of Major Muscles.

4. Motor Unit and All and Non-law,

5. Reciprocal Innervation

6. Line of Gravity, Centre of Gravity, Gravitational Force , Axis and Planes

7. Equilibrium and Friction, Newton's Laws of Motion, Centripetal; Centrifugal Force and Types of Lever

8. Prevention of Injuries

9. Massage, Postural Deformities. Therapeutic Exercises, Rehabilitation of Sports

Injuries. Planes and Axes of Movement, Joints and Levers in Human Body,

Mechanical Analysis of Fundamental Movements, Mechanical Analysis of Sports

Technique Work, Power and Energy, Kinetics (Linear and Angular) - Force, Torque

and Moment of Force, Laws of Motion, Muscle Angle of Pull, Impulse, Momentum,

Kinematics (Linear and Angular) - Distance, Displacement, Speed, Velocity,

Acceleration, Projectile Motion, Vectors, Scalars, Fluid Mechanics - Buoyancy,

Drag, Lift, Magnus Effect, Aerodynamics, Hydrodynamics, Spin.

Unit-12. Tests & Measurements

1. Tests, Measurements, Evaluation, Statistics, their Meaning .

2. Measures of Central Tendency, Measures of Variability.

3. Criteria of Test Selection

4. Motor Fitness Tests (AAHPER, JCR, Barrow , Indiana)

5. Skill Tests of different Games & Sports. (Hockey, Volleyball, Basketball, Football,Badminton)

Concepts in Tests and Measurements, Nature of Measurement and Evaluation,

Purposes of Measurement, Testing and Evaluation, Validity, Reliability and Objectivity

of test, Norm Referenced Reliability and Validity, Criterion Referenced Reliability and

Validity,

Fitness Test Batteries, Developing Questionnaires, Measuring - Aerobic Capacity,

Body Composition, Muscular Strength and Endurance, Flexibility, Speed, Agility and

Reaction Time, Balance (Static and Dynamic) and Physical Activity, Human

Performance Laboratory, Assessment of Sport Skills and Motor Abilities,

Psychological Measurements in Sports and Exercise, Planning, Constructing,

Administering, Scoring and Analyzing the Test.

Unit-13. Management of Physical Education

1. Meaning, Phases, Nature and Importance of Management.

2. Location, Preparation, Layout and Maintenance of Play Fields Construction,

3. Cares and Maintenance of Gymnasium and Swimming Pool.

4. Equipment in Physical Education Criteria of selection, procedure of purchase,

care

and maintenance of equipment's.

5. Intramural and Extramural Programmes.

6. Budget for Physical Education -Budget making and accounting

7. The World of Sports and its Business Ecosystem, Stakeholders, Sports Marketing, Sports Sponsorship,

8. Endorsement, Branding,

9. Sports Broadcasting, Media and Sports, Fan Engagement, Sport Governance, SWOT Analysis,

10. Performance Management System, Scouting and Identification of Talent, Brand Marketing,

11. Human Resource Management in Sports,

Unit-14. Sports Training

1. Meaning, Definition and Principles of Sports Training.

2. Training Load Definitions, types and factors of training and Adaptation,

3. Meaning, Factors affecting and Classification of speed, strength, endurance, Flexibility and Coordinative abilities.

4. Means and method of development of Motor Abilities (speed, strength, endurance, Flexibility, Coordinative abilities).

5. Meaning, types & importance of Periodization.

6. Aim, & contents of different phases of Periodization, Build up and Main Competition,

7. Psychological Preparation for competition

8. Health Related Physical Fitness, Skill Related Physical Fitness,

9. Training –Strength, Endurance, Flexibility, Speed, Agility, Plyometric, Warmup and Stretching,

10. Training Load, Volume, Intensity, Specificity, Rest Interval, Frequency, Density, Adaptation, Overload, Overtraining,

11. Planning & Periodization, Short term plan, Annual Plan, Supercompensation,

Detraining and Retraining

Unit-15. Physical Activity and Health Promotion

Health and Its Determinants, Physical Inactivity Versus Physical Activity, Role of Physical activity in Growth and Development, Physical Assessment and First Aid Techniques, Types of Injury, Common Sports Injuries and Therapeutic Measures, Tissue Healing, Reducing Risk of Injury and Re-injury, Physical Activity and Mortality, FITT (Frequency, Intensity, Time and Type) Principle, PRICE (Protection, Rest, Ice, Compression and Elevation) Principle, Physical Activity and Prevention of Diseases, Physical Activity and Postural Deformities

Unit-16: Research and Statistics in Sports

Types of Research, Research Process, Preparation of Research Proposal, Types of Research Design, Sampling Techniques, Ethical Issues in Research Descriptive Statistics and Inferential Statistics, Central Limit Theorem, Measures of Central Tendency, Measures of Variability, Normality of the Data, Probability, Hypothesis Testing – Types of Hypothesis, Level of Significance, Type 1 and Type 2 Error, Power of the Test, T value.

Faculty of Commerce and Business Studies
(S K Somaiya College)

Subject offered

- Commerce and Business studies

About Research Center

" Research is to see what everybody else has seen and to think about what nobody else has taught."

The Research centre in Commerce and Business studies has been established by the Department of Commerce & Business Studies, S K Somaiya College, Somaiya Vidyavihar University. It is the first private university vide the Maharashtra self-financed universities. The primary focus of the Ph.D. centre is to provide world class education, experiential learning with well-developed business insights, critical decision making based on innovative research culture which is cultivated for over six decades keeping in touch with the roots. The Ph.D. Research programme of Commerce &Business has started from the academic year 2021-22.

Salient Features

1. Ph.D in Commerce & Business studies includes General management, Commerce and Business areas like Entrepreneurship, Marketing, Organisational behaviour, Leadership, and other related areas.
2. Experiential Research.
3. Optimum mix of methods and domain courses.
4. A culture of sharing research for budding researchers.
5. State of the Art library portal with access to a large repository of research journals, books and other publications.
6. Trained professionals to guide the learners.
7. Training programs on latest analytical tools viz., SPSS & R.
8. Workshops on paper writing skills.

Objective:

The research Centre provides a broad framework to guide scholarly research with the following objectives:
• To create and promote a research culture among the faculty and research students.
• To identify research areas and specific research topics of relevant academic significance.
• To organize workshops/FDP on research topics and training programmes on research methodology.
• To ensure quality, integrity, and ethics in research.

• To publish research material in appropriate media and to make available such published information to the end users.
• To facilitate the publication of reports submitted by the research scholars.
• To serve as a facilitator providing research guidance to the research students of S K Somaiya college under commerce and business studies.

Vision- To be the top-rated Research centre for Commerce and Business studies in the next five years.

Mission- To Foster the spirit of inquiry in the field of Commerce and Business studies, develop new innovations and breakthroughs with the culmination of theoretical concepts, practical along with sustainable development.

Research process

At SKSC we believe that research is the cornerstone of knowledge creation, and dissemination. In the fast-paced business world, research provides a framework for refinement of existing business practices. Keeping this in mind, our research process is to "Provide support to inquisitive minds." i.e., to extend requisite support to the faculty, students, and researchers in all aspects in pursuit of their quest for knowledge.

While preparing for the Ph. D. Course Work syllabus, we have kept in mind the paradigm shifts in business pedagogies and management theory and its modern practices at national and international level, updating the reading lists and introduction of practical/fieldwork component and innovations in the instructional methodologies [supplementing the lecture method with group discussions and seminar presentations, use of audio-visual aids, use of computers /internet in research].

Outcome

The student develops applied competencies and practical skills in mastering, interpretation, understanding, and application of Business Management principles, culminating in independent and original scientific work. Qualifying students display competence in the application of related research methodology, and the proper written and oral communication of the research process and findings. The thesis would constitute a decided contribution to the knowledge of an insight into the subject discipline, enabling students to reflect on the field of research.

Conclusion

PhD in commerce and business studies is the highest academic degree awarded in the study of Management science. The degree is designed for those seeking academic research and teaching careers as faculty or professors in the study of management at business schools worldwide. It is a great place to launch your research career.

Eligibility at UG/PG Degree	
Branch of study at UG	General Management Marketing Management Organizational Behaviour Entrepreneurship Management
Branch of study at PG	General Management Marketing Management Organizational Behaviour Entrepreneurship Management

Syllabus for Entrance Examination

Unit 1: Financial And Management Accounting

Basic Accounting Concepts, Capital and Revenue, Financial Statements , Cost and Management Accounting , Ratio Analysis, Cost of Capital ,Capital Structure, Cash Flow Statement, Break Even Analysis.

Unit 2 : Financial System

Financial Markets- Primary and Secondary Market , Money Market and Capital Market; Financial Regulatory Bodies (RBI, SEBI) ; Financial Institutions- Development banks, Non Banking Institutions, Digitization of Banking, Internet Banking, Mobile Banking. Financial Services- Insurance, Credit rating, Mutual Fund, Hire purchase, Venture Capital

Unit 3: Business Administration

Principles of Management, Management Theories and Approaches of Management. Functions of management:Planning, Organizing, Staffing, Controlling, Communication,Leadership, Motivation, Corporate Governance, Corporate Social Responsibilities.

Unit4: Marketing Management

Marketing Concept and Tools,Marketing Environment,Consumer Behaviour and Market Segmentation, Targeting and positioning, The Marketing mix, Direct and Online Marketing, Marketing Audit.

Unit 5: Human Resource Management

Meaning, Scope , functions, Challenges and Future of HRM, Human Resource Planning - Objectives, factors affecting HRP, process of HRP, Human Resource Development- Meaning, Objectives and Functions. Performance Appraisal- Concepts , Process, Methods and problems, Career Planning- Concept, Career Stages and Succession planning.

Unit 6: Research Methods

Research - Meaning, Objectives, Research Process, Characteristics of a good research, Research Design and its types, Formulation of research problem,Research Proposal: Elements of a Research Proposal, Drafting a Research Proposal, Evaluating a research proposal, Hypothesis: Qualities of a good hypothesis, types of hypotheses, framing Null Hypothesis & Alternative Hypothesis. Concept of Hypothesis Testing, Sampling, Measurement and data collection, Data Analysis and Interpretation & Report Writing.

Faculty of Humanities
(S K Somaiya College)

Subject offered

- Economics
- Mass Communication & Journalism

Economics

About Research center

S.K.Somaiya College's, Research Center in Economics (SKSCRCE) aims to develop a theoretical, practical and methodological base for the analysis of economic problems. It has aim to use micro-econometric methods in the empirical research and train students in such methods. SKSCRCE integrates fundamental and applied research in Behavioral Finance, Game theory, Econometrics, Quantitative and Operational Research.

Econometrics research at SKSRCE aims at the development of econometric models as well as statistical and computational methods applied to economic data. The current research areas in econometrics are financial econometrics, time series econometrics, simultaneous equations systems and Bayesian methods. The center aims for major contribution in areas such as discrete optimization, integer programming and convex optimization. Due to evolution of the internet and the increasing digitization of many areas and sectors. The data sets enable new insights and allow addressing new research questions. There are new methodological challenges to use time series, cross sectional and panel data sets.

The center planned to do data analysis through SHAZAM, STATA, MATLAB, R Tool, SAS and Eviews software. Research center discuss different subjects in economics, but the basic area of research is individual, firm, economic freedom, social values, public goods , monetary policies and budgets. The domestic and global markets do not operate freely. There are domestic and global factors responsible for its fluctuations. The research center is focusing on macro-economy, politico-economy, public policy, banking, agriculture, infrastructure, energy, international trade, manufacturing sectors, COVID-19. Center keeps updates on money and capital market as well as equity, debt, foreign exchange and derivative market. Along with this, SKSRCE also has objective to understand the public policy and the market scenarios. SKSRCE research aims at contributing to the understanding of a variety of economic issues key to the functioning of economies, with an emphasis on possible policy interventions to improve economic outcomes. SKSRCE aims quality research outcome from Ph.D. students. The guidance is carried out in the framework of the doctoral programs of Somaiya Vidyavihar University. The program accepts students with various backgrounds though strong interest and knowledge in economics. Students are

expected to have knowledge of subjects such as Econometric, Mathematical economics, Demography, Development Economics, Environmental issues and Financial economics.

Among the scientific events organized at SKSRCE, there are regular doctoral program related workshops where Ph.D. students can present their completed and on-going research. The lecture series hosted of renowned scientists and Economists from India and foreign academic institutions. SKSRCE is a frequent organizer and co-organizer of various scientific events at the local and international level. The regular research events are planned such as conferences, meetings, workshops, forums. The quality along with the good number of Ph.D. these will be completed. SKSRCE indicate that research programs will flourish within short span of time. A significant number of students from overseas expected to join the programs at SKSRCE.

Eligibility at UG/PG Degree	
Branch of study at UG	Basic Econometrics Mathematical Economics Public Economics Monetary Economics
Branch of study at PG	Advanced Econometrics Mathematical Economics Health Economics Development Economics

Syllabus for Entrance Examination
CSIR – NET/JRF syllabus 2022 for Economics

Mass Communication & Journalism

SKSCRCMCJ is the research arm, aimed at promoting and creating valuable research opportunities and producing white papers.

The PhD program is designed to prepare independent scholars for academic careers in teaching and research in mass communication and related fields. Candidates will build a solid foundation in the discipline through multifaceted exploration of the theories and methods that influence the shape and scope of mass communication research. Candidates are strongly encouraged to develop their own theoretical and methodological approach to mass communication research and to interact and collaborate with multidisciplinary faculty on cutting-edge research in mass communication in the global and multicultural context.

A significant part of the Centre is to now acknowledge the role of practice-based research in creating new knowledge and pushing the boundaries of existing art and media practices within academia.

Mass Communication & Journalism Research Center (SKSCRCMCJ) engages in the conduct of rigorous interdisciplinary research; hosts symposia and conferences; provides state-of-the profession trainings and workshops; facilitates a dialogue among working journalists, industry executives, consumer and public interest groups, and policy makers and sponsors events and proceedings that critique and define emerging developments in the journalism profession.

Eligibility at UG/PG Degree	
Branch of study at UG	B.A. Mass Communication and Journalism B.A. English
Branch of study at PG	M.A in Journalism and Mass Communication M.A Advertising & PR M.A in Entertainment Media & Advertising M.A. Media Studies M.A Communication

Syllabus for Entrance Examination
UNIT I- COMMUNICATION & JOURNALISM   - Basic terms- definition, Types, concepts, nature and process.   - Mass Communication in India - Reach, access and nature of audience.   UNIT II- ROLE OF MEDIA AND SOCIETY.   - Characteristics of Indian society.   - Impact of media on specific audiences- women, children etc.   - Mass campaigns for specific issues- social concerns, environment, human rights, gender equality.   - The Press, Radio, Television, Cinema and traditional forms of communication.   UNIT III- Journalism as a profession   - Indian Constitution and Freedom of Press   - Ethics and Journalism   - Careers in Journalism and Mass media, Freelancing   - Research restrictions.

UNIT IV- PRINT AND BROADCAST MEDIA

- History of Print and Broadcast media in general with particular reference to India, Major landmarks.

- Newspapers and Magazines- English and Indian languages.

- Press Council, The Press Commission- Their recommendations.

- Development of Radio after Independence- Extension role, general and specific audience programs.

- Development of Television- perception, initial development and experimental approach.

- SITE- phase and evaluation.

- Cinema- historical overview and contemporary analysis, Commercial, parallel and documentary genres.

UNIT V- COMMUNICATION AND THEORIES OF SOCIAL CHANGE

- Role of media in social change – dominant paradigm.

- Developmental initiatives- State, market and third force (NGO sector).

- Participatory approaches and community media, ownership and management perspectives.

UNIT VI- INTRODUCTION TO RESEARCH METHODS AND PROCESS

- Mass communication research –historical overview.

- Communication research in India-Landmark studies related to SITE.

- Content Analysis-Qualitative and Quantitative approaches.

- Sampling techniques- strengths and limitations.

- Statistical methods of analysis.

UNIT VII - RADIO, TV AND VIDEO AS MEDIA OF COMMUNICATION

- Role of producer

- Writing for Radio.

- Writing for TV- Researching for scripts.

- Camera movements.

- Formats for Radio, TV.

- Sound design, microphones, sets and lighting.

- Satellite, Cable TV, computers and microchips.

UNIT VIII – ADVERTISING

- Advertising

- Marketing

- Ad copy and layout

- Public Relations.

- Public Opinion

- Propaganda.

Faculty of Humanities
(Department of Library and Information Sciences)

Subject offered

- Library and Information Science

Library and Information Science

Since the inception of Somaiya Vidyavihar Complex, the 'Somaiya Group' has continuously aimed for perseverance, excellence, quality and status quo in the field of higher education for almost 7 decades. Although SVU central library evolved with the establishment of Somaiya Vidyavihar University in 2019, the campus is well equipped with multi-faceted libraries reaching to students from various academic fields. To disseminate information the University is initiating the 'Hub and Spoke' model for the libraries – With the central library being the Hub and the constituent college libraries the Spoke.

SVU has initiated the Department of Library and Information Science in the 2021. In the current Academic year department has announced MLISc. and Ph.D. in Library and Information Science. This research centre has eminent faculty with 44 years professional and 30 Years teaching experience in Library and Information Science.

Library & Information Science

Library and Information Science is mainly concerned with the retrieval and management of information whether in physical or digital form. The digital age has brought transformative changes in the scholarly communication and information environment, has dramatically changed the academic and professional discipline of library and information science. The academic libraries play a vital role in the digital transformation of the universities and education institutions all over the globe. Belonging to an interdisciplinary field of study, library and information science education borrows tools from areas such as management, information technology and education, to collect, organize, preserve, and prioritize information resources. As an increasingly digitalized field of activity, library science is often associated with study programmes in informatics and information science. Students of library science learn to navigate the digital world, to properly handle information and to enable users to access it easily. The libraries being the repositories of knowledge and information, their importance has increased. In this situation, the librarianship

has attained the status of a separate discipline with an interdisciplinary subject area

Eligibility at UG/PG Degree	
Branch of study at UG	1. Bachelor degree from any UGC approved college 2. Bachelor of Library and Information Science degree from LIS department of University approved by the UGC
Branch of study at PG	Master of Library and Information Science PG degree from LIS Department of the University, approved by UGC.

Syllabus for Entrance Examination

Research methods in Library and Information Science
- Research: Introduction, Definition, Purpose, Characteristics, Objective, Types, Steps Research Design, Hypothesis – Formulation, Types and Testing; Research Methods: Historical, Descriptive, Survey, Case Study; Qualitative and Quantitative Methods; Different metrics studies. Sampling Techniques, Citation Analysis, Impact Factor, h-index, g-index, i10-index.
- Plagiarism: Concept, Definition, Types, Fair Use, etc.
- Plagiarism Checking Tools: Working, Advantages, Issues and Challenges
- Data Collection tools viz Questionnaire, Interview, Observation; Sources of Data-Primary and Secondary
- Data Presentations, Analysis and its Interpretation
- Current research trends in LIS
- Research Report Writing
- Reference Style; Online Citation Tools

Library Management
- History of Management Schools and thoughts, Collection Development,
- Human Resources Management-Manpower Planning, Job analysis, Job description, Selection, Recruitment, Motivation training and Development, Staff manual, Leadership and Performance Evaluation, Delegation of authority, PERT CPM
- Financial Management-Budget, Resource Generation, Types of Budgeting, Cost and Cost-Benefit analysis
- Total Quality Management (TQM), Six Sigma, Brainstorming session, Marketing Information product and services
- Metrics of efficiency and effectiveness of libraries and knowledge resource centres. Performance, Function, Evaluation of libraries and library services.

ICT applications in Libraries
- Computer: Hardware and Software components, Internet Components, Services,

Browsing-Web Browsers, Search Engines Meta-Data and Meta-Data Standards, IOT.
- Library Automation, Study of Library Management System and Related technologies i.e. RFID, Barcode and others, electronic security.
- Digitization and its Standards, Digital library software.
- Library Networks and Information Systems- National and International.
- Impact of ICT on Library and Information Services.

Faculty of Dharma Studies
(K J Somaiya Institute of Dharma Studies)

Subject offered

- Sanskrit
- Buddhist Studies
- Philosophy

Sanskrit

About Research Center

In Sanskrit research centre, projects on different aspects of Sanskrit are being undertaken. The students and faculty members are encouraged to publish their work in reputed journals or present papers in conferences. Faculty members have completed / carried out research projects and publications in inter-disciplinary fields, such as, Ayurveda, Rituals, Religion, etc. Faculty members have published more than 15 books.

Thrust areas of the department are –
1) Indian Philosophy
2) Indian Knowledge Traditions
3) Yoga Philosophy
4) Ancient Indian Sciences.

Research projects entitled 'Vanaspatyam' has been completed which gives description of medicinal properties of more than 100 herbs mentioned in Ayurvedic scriptures. Research project cum publication entitled 'Hindu-Christian Dictionary' has been completed which gives information of important terms associated with Hinduism and Christianity.

Eligibility at UG/PG Degree	
Branch of study at UG	Sanskrit or any other subject
Branch of study at PG	Sanskrit or allied subject

Syllabus for Entrance Examination

Veda:

- Classification of Veda-s – Saṃhitā, Brāhmaṇa, Āraṇyaka, Upanishad, Vedaśākhā, Different theories regarding the period of Veda-s
- Vedāṅga-s
- Sūkta-s – Ṛgveda - Agni (1.1), Varuṇa (1.25), Indra (2.12), Uṣas (3.61), Parjanya (5.83), Puruṣa (10.90), Hiraṇyagarbha (10.121), Nāsadīya (10.129), Śukla Yajurveda – Śivasaṅkalpa (34.1-6), Atharvaveda – Rāṣṭrābhivardhana (1.29), Pṛthvī (12.1)
- Upanishads- subject matter of principle 11 Upaniṣad-s
- Nirukta (Chapter 1, 2)

Darshana:

- Important texts, scholars and tradition of darśana
- Nyāya Darśana – Pramāṇa, 16 padārtha-s, distinctive principles of prācīna nyāya and navya nyāya, ārambhavāda, arguments to prove existence of Īśvara, features of language style of navya nyāya, influence of nyāya darśana on the other śāstra-s
- Vaiśeṣīka Darśana – Sapta padārtha, concept of paramaṇu, three types of causes, relationship of vaiśeṣika and nyāya darśana
- Sāṃkhya Darśana – Three types of duḥkha, pramāṇa, 25 elements, satkāryavāda, similarities and differences in 25 elements, triguṇa, pratyaya-sarga, kaivalya
- Yoga Darśana – Definitions of Yoga, Concept of citta and cittavṛtti, cittabhūmi, abhyāsa - vairāgya, Īśvara and praṇava, citta-vikṣepa, citta-prasādana, samāpatti, kriyāyoga, kleśa, karma-siddhānta, caturvyūha, aṣṭāṅgayoga, siddhi-s, kaivalya, relationship of sāṃkhya and yoga.
- Mīmāṃsā Darśana – Concept of dharma, bhāvanā, types of vidhi, pramāṇa in viniyoga-vidhi, nāmadheya, niṣedha, arthavāda, sects of mīmāṃsā, theories of interpretation of sentence, relationship of mimāṃsā and Veda
- Vedānta Darśana – Sādhana-catuṣṭaya, adhyāropa-apavāda, concept of Brahma, avidyā, pañcakoṣa, pañcīkaraṇa, manifestation of the world, means of self-realization, tattvamasi mahāvākya, relationship of Vedānta and Upaniṣads, Sects of Vedānta
- Cārvāka Darśana – Metaphysics, refutation of anumāna, objections and faults in Veda-s
- Bauddha Darśana – Four sects, Āryasatya, four bhāvanā-s, Kṣaṇikavāda, Śūnyavāda, Vijñānavāda, Sarvāstivāda, Mahāyāna and Hīnayāna
- Jain Darśana – Seven tattva-s, Syādvāda, Arhat

Vyakarana:

- Vaiyakarana Siddhanta Kaumudi - Samjna-Prakaranam, Paribhasha-Prakaranam, Sandhi-Prakaranam, Subanta-Prakaranam, Avyaya-Prakaranam, Stri-Prakaranam, Karaka-Prakaranam, Samasa- Prakaranam, Taddhit-Prakaranam, Kridanta-Prakaranam, Tinganta-Prakaranam

- Paribhashendushekhara
- Mahabhashyam (1st & 2nd Anhikam)
- Vakyapadiya (Balakanda)
- Vaiyakarana-Bhushansar (Dhatvartha-Prakaranam)

Sahitya:

- Acharya-s and their works - Bhāsa, Aśvaghoṣa , kālidāsa, Śūdraka, Viśākhadatta, Bhāravī, Māgha, Harṣa, Bāṇabhaṭṭa, Daṇḍin, Bhavabhūti, Bhaṭṭanārāyaṇa, Bilhaṇa, Shrīharṣa
- Schools of Sanskrit Poetics – Rasa, Alaṅkāra, Rīti, Dhvani, Vakrokti, Aucitya
- Poetry: Buddhacaritam (First Canto), Raghuvaṁśam (First Canto), Kirātārjunīyam (First Canto), Śiśupālavadham (First Canto), Naiṣadhīyacaritam (First Canto)
- Drama: Svapnavāsavadattam, Abhijñānaśākuntalam, Mṛcchakaṭikam, Uttararāmacaritam, Mudrārākṣasam, Uttararāmacaritam, Ratnāvalī
- Prose: Daśakumāracaritam (VIII Ucchvāsa), Harṣacaritam (V Ucchvāsa),Kādambarī (Śukanāsopadeśa)
- Campū Kāvya - Nala Campū (I Ucchvāsa)
- Sāhityadarpaṇa: Definition of Kāvya, Refutation of other definitions of Kāvya, Śabdaśakti –
- Saṅketagraha; Abhidhā; Lakṣaṇā; Vyañjanā, Kāvyabheda (Chapter Fourth), Śravyakāvya
- Kāvyaprakāśa – Kāvyalakṣhṇa, Kāvyaprayojana, Kāvyahetu, Kāvyabheda, Śabdaśakti, Abhihitānvayavāda, Anvitābhidhānvayavāda, concept of Rasa, discussion of Rasasūtra, Rasadoṣa, Kāvyaguṇa, Vyanjanāvriti (Fifth Chapter)
- Alaṅkāras – Vakrokti; Anuprāsa, Yamaka, Śleṣa, Upamā, Rūpaka, Utprekṣā, Samāsokti, Apahnuti, Nidarśanā, Arthāntaranyāsa, Dṛṣṭānta, Vibhāvanā, Viśeṣokti, Svabhāvokti, Virodhābhāsa, Saṅkara, Sansṛṣṭi
- Dhvanyāloka (I Udyota)
- Vakroktijīvitam (I Unmeṣa)
- Bharata – Nāṭyaśāstram (First and Sixth Chapter)
- Daśarūpakam (First and Third Prakāśa)
- Chanda – Āryā, Anuṣṭup, Indravajrā, Upendravajrā, Vasantatilakā, Upajāti, Vaṁśastha, Drutavilambita, Śālinī, Mālinī, Śikharṇī, Mandākrāntā, Hariṇī, Śārdūlavikrīḍita, Sragdharā
- Rāmāyaṇa and Mahābhārata – Subject matter, age, society in the Rāmāyaṇa, Rāmāyaṇa as a source of later Sanskrit works and literal value of the Rāmāyaṇa, legends in the Rāmāyaṇa

Buddhist Studies

About Research Center

In Buddhist Studies research centre, innovative and research-oriented projects are being undertaken in Buddhist Studies. Research is conducted in the following thrust areas –

- Critical interpretation of Buddhist and Sanskrit inscriptions in South East Asia
- Translation of Books in English and Marathi

Eligibility at UG/PG Degree	
Branch of study at UG	Buddhist Studies or any other subject
Branch of study at PG	Buddhist Studies or Pali or allied subject

Syllabus for Entrance Examination
• Biography of Buddha: Literary sources: Pali and Sanskrit • History of Buddhism: Councils, Origin and Development of Buddhist schools, Royal patrons. • Buddhist Literature: Pali Canonical and Non canonical literature, Buddhist Sanskrit Literature • Schools of Buddhism and their philosophy • Socially Engaged Buddhism • Revival of Buddhism • Women in Buddhism • Buddhist Education system • Buddhism outside India: Sri Lanka, Burma, China, Japan, Korea. • Buddhist Archaeology • Buddhist Architecture: Structural and Rock-cut. • Buddhist Art: Aniconism, schools of Buddhist Art (Gandhara, Mathura, Sarnath, Amaravati), Iconography, Paintings (Ajanat & Bagh) • Epigraphy

Philosophy

About Research Center

In Philosophy research centre, projects on different aspects of Western and Indian philosophy are being undertaken. Also, interfaith dialogue meetings bringing together Hindu, Christian and Muslim scholars. The students and faculty members are encouraged to publish their work in reputed journals or present papers in conferences. Faculty members have completed / carried out research projects and

publications in inter-disciplinary fields, such as, the Concept of God in Indian Medieval Philosophy; Glossary of philosophical terms; Dictionary of Hindu and Christian religious and philosophical terms; The Concept of Human Action in Rāmānuja and Thomas Aquinas; The possibility of rational knowledge of God etc.

Thrust areas of the department are –
1. Western Philosophy, with emphasis on Ancient and Medieval;
2. Metaphysics;
3. Natural Theology;
4. Philosophy of Religion;
5. Anthropology;
6. Ethics;
7. Social and Political Philosophy;
8. Comparative Philosophy

The centre has a well-furnished library which is open every day from 10 am to 5 pm. Students and Faculty have access to printed books as well as online digital journals, such as JSTOR, a portal with access to almost 2000 journals.

Eligibility at UG/PG Degree	
Branch of study at UG	BA in Philosophy or graduation in any other discipline
Branch of study at PG	MA in Philosophy

Syllabus for Entrance Examination
Western Philosophy -   Western Ancient Philosophy   • The Presocratic Philosophers and the beginning of philosophy in Greece   • Socrates and the concept of virtue   • Plato and the Myth of the Cave in the Republic.   • Aristotle and the Organon (Logic)   • Aristotle and the First Cause: the unmoved mover   • Neoplatonism: Plotinus   • The importance of Stoicism   Western Medieval Philosophy   • Christian Neoplatonism: Augustine, Boethius and Pseudo-Dionysius   • Anselm and the Ontological Argument for God's existence   • Aquinas' Metaphysics and its Aristotelian background

- William of Ockham and Logical Nominalism

Western Modern Philosophy

- Renaissance and philosophy

- Descartes and the Methodical doubt: Importance of certitude

- Pascal and his critique to Rationalism

- Spinoza's Metaphysics: Substance and Modes

- The Social Contract in Thomas Hobbes

- Locke's Empiricism and his political philosophy: Tolerance, as the foundation of political and economic liberalism

- The Enlightenment

- Kant and the limits of human knowledge

- History of Conscience in Hegel. Hegelian Dialectic

Western Contemporary Philosophy

- Feuerbach and Marx: Theory of Historical Materialism

- Utilitarianism and Pragmatism: Jeremy Bentham and John S. Mill

- Positivism and the Law of Three Stages: Augusto Comte

- Phenomenology: Husserl and Max Scheler

- Neo-Thomism: The rediscover of Aquinas: Maritain and Gilson – Faith and Reason

- The Vienna Circle: Logical Empiricism

Indian Philosophy -

- Important texts, scholars and tradition of darśana

- Nyāya Darśana – Pramāṇa, 16 padārtha-s, distinctive principles of prācīna nyāya and navya nyāya, ārambhavāda, arguments to prove existence of Īśvara, features of language style of navya nyāya, influence of nyāya darśana on the other śāstra-s

- Vaiśeṣīka Darśana – Sapta padārtha, concept of paramaṇu, three types of causes, relationship of vaiśeṣika and nyāya darśana

- Sāṃkhya Darśana – Three types of duḥkha, pramāṇa, 25 elements, satkāryavāda, similarities and differences in 25 elements, triguṇa, pratyaya-sarga, kaivalya

- Yoga Darśana – Definitions of Yoga, Concept of citta and cittavṛtti, cittabhūmi, abhyāsa - vairāgya, Īśvara and praṇava, citta-vikṣepa, citta-prasādana, samāpatti, kriyāyoga, kleśa, karma-siddhānta, caturvyūha, aṣṭāṅgayoga, siddhi-s, kaivalya,

relationship of sāṃkhya and yoga.

- Mīmāṃsā Darśana – Concept of dharma, bhāvanā, types of vidhi, pramāṇa in viniyoga-vidhi, nāmadheya, niṣedha, arthavāda, sects of mīmāṃsā, theories of interpretation of sentence, relationship of mimāṃsā and Veda

- Vedānta Darśana – Sādhana-catuṣṭaya, adhyāropa-apavāda, concept of Brahman, avidyā, pañcakoṣa, pañcīkaraṇa, manifestation of the world, means of self-realization, tattvamasi mahāvākya, relationship of Vedānta and Upaniṣads, Sects of Vedānta

- Cārvāka Darśana – Metaphysics, refutation of anumāna, objections and faults in Veda-s

- Bauddha Darśana – Dependent origination, Karma and rebirth, Two truths, Dhamma theory, Śūnyatā and vijñānavāda

- Jain Darśana – Seven tattva-s, Syādvāda, Arhat

Faculty of Music & Performing Arts
(Maya Somaiya School of Music and Performing Arts)

Subject offered

- Music

About Research Center

The Research Centre in Music has been established at the Maya Somaiya School of Music & Performing Arts, Somaiya Vidyavihar University. The primary focus of the Ph.D. Centre for Music is to provide for high quality research in music with the help of world class education, training and innovative research work. The interface of multiple disciplines to create specialised human resources in disciplinary and interdisciplinary areas of Music in a globally competitive research milieu, both basic and applied research topics will be addressed. The Ph.D. Research programme is starting from the academic year 2023-24.

Faculty members also regularly collaborate with other Universities, other international, national and state level organisations that archive, propagate and disseminate music. Their research components further strengthens & enriches the teaching programme. Owing to the high quality of academic practices the Department is able to generate excellent human resources in Music.

The Dean & Faculty are highly acclaimed in the field of performing arts and research. Their research is published in Journals, Book Publications, and they have been Editors of different Journals. Their research is also available in the public domain like YouTube Videos, interviews published and broadcasted on notable platforms. Ph.D. guides have expertise in variety of subjects of Hindustani Classical Music like Voice culture, Gharana System, Compositional forms of different genre, etc.

KEY FEATURES

- State-of-the-art class rooms.
- Department with Ph.D. qualified faculty.
- Dynamic curriculum with right mix of practical and theoretical topics of Music.
- Aim for Research-driven opportunities in Institutions in India and abroad.
- Wide range of programs and open electives.
- Opportunity for students to carry out inter-disciplinary research projects.
- Workshops, Invited Lectures and Performances on a regular basis.
- State-the art auditoria and sound system.
- Studio adept in modern technology.

Eligibility at UG/PG Degree	
Branch of study at UG	BPA – Vocal (Gayan) BPA – Swara Vadya (Harmonium & Flute) BPA – Taal Vadya (Percussion)
Branch of study at PG	MPA – Vocal (Gayan) MPA – Swara Vadya (Harmonium & Flute)

Syllabus for Entrance Examination

1. Technical-Terminology.

Dhwani, Naad, Shruti, Swara, Graam-Moorchana, Jaati, Thaat (Mela), Raag, Aalap, Taan, Gamak, Gandharva, Gaan, Margi-Deshi, Geeti, Nibaddha-Anibaddha, Varna, Alankar, Melody, Harmony, Swar-Samwad, Saptak, Musical Scales, Alpatva-Bahutva, Avirbhav-Tirobhav, Laya, Taal, Matra, Avartan, Khand-Vibhag, Theka, Gat.

2. Applied Theory

Detailed and critical study of Raagas, Classification of Raagas (Vargikaran). Grama-Raaga, Mela-Raaga, Raag-Raagini, Thaat-Raaga, Raaganga. Time-theory of Raagas, Placement of Shuddha and Vikrit Swaras on Shruties in ancient, medieval and modern period.

Detailed knowledge of prevalent Taalas of Hindustani music. Knowledge of Taala Dash praanas. Margi and Deshi Taalas of ancient period.

3. Compositional forms and their Evolution

Prabandha, Dhrupad, Dhamar, Saadra, Khayal, Thumri, Tappa, Tarana, Chaturang, Trivat,

4. Gharanas and Gayaki

Origin, development and contribution of Gharanas in preserving and promoting Hindustani classical music (Vocal-Instrumental).

5. Contribution of Scholars to Indian Music and the study of Important Granthas (treatises).

Natya-Shastra, Brihaddeshi, Sangeet-Makarand, Geet-Govinda, Sangeet Ratnakar, Rag-Tarangini, Swara-Mela-Kalanidhi, Sadraag-Chandrodaya, Sangeet Raj, Sangeet-Parijat,   Hridya Prakash, Chaturdandi Prakashika, Raag-Tatva-Vibodh, Raag-Darpan, Nagmat-e- Asaphi, Bhatkhande Sangeet Shastra (Vol.1-4), Raag-Vigyan, Sangeetanjali, Sangeet Chintamani, etc.

6. Historical Perspective of Music.

A study of the historical development of Hindustani music (Vocal, Instrumental). Contribution of Western Scholars to Indian Music.

7. Aesthetics

Its origin, expression and appreciation: Principle of aesthetics and its relation to Indian Music. Rasa theory and its application to Indian Music.
Relationship of Musical aesthetics and Rasa to Hindustani Music (Vocal, Instrumental).
Inter-relationship of Fine Arts with special reference to Raag-Raagini Paintings, Raag-Dhyaan and others.

8. Instruments

Origin, development, material used and structure of various instruments and their well-known exponents of Hindustani Music (Vocal, Instrumental).
Classification of Instruments of Hindustani Music.

9. Folk Music

General study of the folk music of various regions of India like Panjab, Uttar Pradesh, Bengal, Haryana, Rajasthan, Gujarat, Maharashtra South India and other.

10. Music Teaching and Research Methodology

The methodologies of music research: identifying area, preparing synopsis, data collection, field work, writing project reports, finding bibliography, footnotes, reference material etc. with reference to Hindustani music.

Details of Ph.D Coordinators

College Code	College / Institute Name	Name	Email ID
16	K J Somaiya College of Engineering (KJSCE)	Dr. Siddappa Bhusnoor	siddappabhusnoor@somaiya.edu
17	K J Somaiya Institute of Management (KJSIM)	Dr. Vandana T Khanna	vandanat@somaiya.edu
29	Department Of Library andInformtion Science (DLIS)	Dr. Hindurao Waydande	drhindurao.w@somaiya.edu
30	Maya Somaiya School of Music & Performing Arts (MSSMPA)	Dr. Rahul Prakash	rahul.prakash@somaiya.edu
31	S K Somaiya College (SKSC)	Dr. Seema Sambrani	seema.sambrani@somaiya.edu
32	K J Somaiya Institute of Dharma Studies (KJSIDS)	Dr. Rudraksha Sakrikar	rudraksha@somaiya.edu
34	Somaiya Sports Academy (SSA)	Dr. Uttam Kendre	uttam.kendre@somaiya.edu
35	Somaiya Institute for Research & Consultancy (SIRAC)	Dr. Parvathi JR	parvathi.jr@somaiya.edu
Common Email ID			svu.phdcoordinators@somaiya.edu