

MSc & PhD Programmes

PROSPECTUS

2023-2024



Department of Computer Science
Ramakrishna Mission Vivekananda
Research & Educational Institute



Education is the manifestation of perfection
already in man.

Vivekananda





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1. Overview

1.1 The Institution

Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI) is a Deemed-to-be-University that is administered by the Ramakrishna Mission – a charitable, philanthropic, and spiritual organization having more than 200 branches world-wide.

Government of India declared RKMVERI, through a Gazetted Notification dated 5 January 2005, as a *de novo* Deemed-to-be-University under Section 3 of UGC Act, 1956. It has four campuses at key locations: Belur (Howrah District, WB, Main campus), Coimbatore (Tamil Nadu), Ranchi (Jharkand), and Narendrapur (Kolkata, WB). The Deemed-to-be-University status was confirmed by the MHRD Notification in 2012.

The School of Mathematical Sciences comprising the Departments of Mathematics, Physics and Computer Science, is functional since July 2008 and located in Belur.

1.2 Areas of Academics

This University offers various programmes in the following areas:

Mathematical Sciences
Sports Science And Yoga
Agricultural Biotechnology
Plant Breeding And Genetics
Rural & Tribal Development
Disability Management & Special Education
General & Adapted Physical Education
Indian Cultural & Spiritual Heritage
Sanskrit
Music

1.3 Notable Laurels

It is a matter of pride that RKMVERI is the pioneer in the country in offering courses in Disability Management & Special Education at our Coimbatore campus. RKMVERI has carved out a mainstream academic venture in this gap area offering undergraduate, postgraduate, and doctoral programs.

In March 2019 this university was accredited by NAAC (National Academic Accreditation Council) with the **A++ grade**, the highest,

with the total cgpa of 3.66 out of 4.

1.4 Programmes offered by the Department

Computer Science and Big Data Analytics play a pivotal role in this era of AI revolution. Their presence in today's world is ubiquitous. There is a great demand, both in industry and in academia, for students who have sound knowledge of the underlying concepts and principles governing computer science and data science as well as the ability to apply them to solve real-world problems.

The Department of Computer Science at RKMVERI trains students to achieve both these goals, which will enable them to excel in their professional careers - be it in academics, research or industry.

Any graduate holding a bachelor degree in any field from any university is supposed to have a broad knowledge of that field. A master degree holder on the other hand should have a deeper understanding of the field. A doctorate in contrast indicates that one has contributed to a field of knowledge in some original way.

The programmes thus aims to make a post-graduate student suitable for both research as well as software industry. After the successful completion of the programme the student is expected to have sufficient breadth of knowledge to be absorbed in any applied software industry, and, if one chooses the path of academic career, to do research in the selected areas in which one has acquired some depth.

The Department of Computer Science at RKMVERI offers two full-time post graduate degree programmess: MSc in Computer Science (CS) (specialisation in AI or Theoritical Computer Science) and MSc in Big Data Analytics (BDA) with the following programme outcomes in perspective.

- Inculcate critical thinking to carry out scientific investigation objectively and not getting biased with preconceptions.

- Equip the student with skills to analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
- Prepare students for pursuing research or careers in industry or in mathematical sciences and allied fields
- Imbibe effective scientific and/or technical communication in both oral and writing.
- Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate the highest standards of ethical issues in mathematical sciences.
- Create awareness towards becoming an enlightened citizen with commitment to deliver ones responsibilities within the scope of bestowed rights and privileges.

1.5 Linkages with reputed institutions

With prior permission from the Dean of academics of ISI kolkata, our students get to credit some courses alongside ISI's Masters students. This way the students get better exposure and an opportunity to interact with a larger group of intellectual peers. Often times we invite professors from ISI, Kolkata to teach our students

The students are tutored additionally by reputed professors teaching in universities abroad and from national institutes such as from IITs on some specialized topics in statistics, computer science and data analytics.

A MoU has been signed with Variable Energy Cyclotron Center (VECC), Kolkata (a unit of Department of Atomic Energy, Govt of India) to carry out research and development in Indian Sign Language recognition and generation. The recognition problem involves identifying gestures and signs of the signers and translate them into natural language/text using state-of-the-art deep learning techniques, while the

generation problem is to translate text into sign language with the help of an avatar (animation).

1.6 The CS-BDA Synergy

The CS and BDA curricula are designed in such a way that the CS students have adequate flexibility to credit some advanced courses (full or partial) along side the BDA students. Thus, a student of CS is also equipped to be a Data Analyst. Likewise, while the BDA student prepares to become a data scientist, he may choose to further strengthen his programming skills or theoretical aspects of computer science by opting courses from the CS curriculum.

The fourth semester is dedicated to executing a Master's Project which is a 8 credit course. The students can choose to do an academic or an industrial project depending on their preferences and available opportunities. The student presentation of the project work is evaluated by the subject experts invited from other institutions.

1.7 Salient Features of the Department

- Advanced curriculum based on industry trends and experts' feedback. (for eg. Bayesian Machine Learning, Reinforcement Learning, Computational Geometry, Computational Topology, Spectral Algorithms, Complexity Theory courses.)
- **Interdisciplinary courses:** Quantum Computing, Econometrics, Finance etc.
- Highly qualified & dedicated teaching faculty (see website for details)
- **Research collaborations** with reputed institutes: VECC, Kolkata, ISI, IITs, TCG-CREST, and Univ. of Liverpool,
- State-of-the-art Labs with GPU computing facilities (Nvidia's A100 GPU)



Images from Perceptron'23 – An inter-university techfest organised by the Department of Computer Science

- DST-FIST grant (worth over 1 crore) to set up a new AI Lab on server sanctioned for big data analytics
- **Fees deliberately kept low to make these programmes affordable for economically challenged strata of the society (Rs.20,000 per semester)**
- Member of National Knowledge Network (high speed internet - 1 Gbps)
- Central library – paperless book-checkouts, internet kiosks etc.
- Audio-visual rooms for online classes, video conferences & regular seminars
- A well defined mentor and mentee relationship with teachers and students to address the personal grievances of the students.
- Students and teachers actively use learning management system to make the learning effective and more accessible.
- On-Campus hostel accommodation & 24 x 7 Wifi Hotspots



2. Offered Programmes

The Department of Computer Science offers three types of programmes:

- a) MSc in Big Data Analytics
- b) MSc in Computer Science
- c) PhD in Computer Science

The details of each of these programme are given below:

2.1 MSc in Big Data Analytics

The MSc in Big Data Analytics is a 4-semester PG degree program. As of now there about 10 institutions in all over India and only one such in West Bengal that offers this degree program. In the first three semesters the students are taught the core concepts, techniques and tools required for large-scale data analysis.

One of the unique features of the BDA programme's curriculum is a rich blend of various disciplines and technologies including mathematics, computer science, statistics, and state-of-the-art big data technologies such as, NoSQL, Hadoop, Spark, etc. Thus, our students will automatically gain interdisciplinary knowledge and skills which are very much essential in today's competitive world. Laboratory sessions and tutorials will put these concepts to practice through the execution of use cases obtained from real life domains.

MSc BDA - Objective Statement

The BDA degree program is designed to inculcate in student the following.

- Basic understanding of statistical methods, probability, mathematical foundations, and computing methods relevant to data analytics.
- Knowledge about storage, organization, and manipulation of structured data.
- Understanding of the challenges associated with big data computing.
- Training in contemporary big data technologies
- Understanding about the analytics chain beginning with problem identification and translation, followed by model building and validation with the aim of knowledge discovery in the given domain.
- Estimation of various statistics from stored and/or streaming data in the iterative process of model selection and model building.
- Future event prediction associated with a degree of uncertainty.
- Modelling optimization techniques such as linear programming, non-linear programming, transportation techniques in various problem domains such as marketing and supply chain manage-

ment.

- Skill to interpret analytical models to make better business decisions.

This two-year degree programme constitutes 80 credits, where each credit is equal to 15 teaching hours.

The fourth semester is dedicated for the 8-credit Master's degree Project. The students can choose to do either an academic or an industrial project depending on their preferences. At the close of the project period the students need to present their work before an elite panel of faculty members, and also submit a dissertation on the topic of the work.

Transferable Skills

Through the medium of course work the students obtain relevant skill and proficiency in,

R (Statistical Programming Language)
Python for Machine Learning (Programming language)
Linux (operating system)
Scikit-Learn, Pytorch, TensorFlow (machine learning tool)
Hadoop, (Big Data technology)
Report preparation and presentation in Latex
Data Visualazation using ggplot2, matplotlib, seaborn
SQL, and No-SQL
Communicative English.

2.2 MSc in Computer Science

The MSc in Computer Science is a 4-semester PG degree programme. The programme offers options for specialisation either in Artificial Intelligence or Theoretical Computer Science. Students can opt for courses from these areas after the completion of their 1st semester. It

is seen that students after the programme completion generally tend to pursue PhD in reputed institutes.

The curriculum for this degree programme has a rich blend of theory and practicals which is very much a prerequisite in pursuing research and development oriented careers. The list of courses offered will highlight the depth and coverage of the syllabus.

MSc CS - Objective Statement

The MSc CS degree program is designed to inculcate in student the following.

- Understanding of the theoretical underpinnings in computing and computing systems.
- Knowledge of the interfacing of s/w with h/w through the study of computer architecture, compilers, and systems programming.
- Knowledge about storage, organization, and manipulation of structured data.
- Knowledge and application of various algorithms, algorithmic methods, and data structures in solving computational problems drawn from various fields such as computational geometry, distributed systems, data mining, mobile computing, computer vision, artificial intelligence etc.
- Understanding of the linkages that optimization techniques has with machine learning, deep learning, data mining, computer vision etc
- Knowledge of complexity classes and its appearance in algorithm design.
- Develop workable solutions for problems drawn either from social context or from research corpus.
- Develop s/w applications for handheld devices in Android.
- Use software development tools, software systems in modern computing platforms.

- Communicate computer science concepts, designs, and solutions effectively and professionally.

Relevant skills obtained through the courses: The students are well versed with

C, C++, Java, R, Python (programming languages)
Linux (operating system)
Scikit-Learn, Pytorch, TensorFlow (machine learning tool)
Hadoop, (big data technology)
Preparation of reports and presentations in Latex
Communicative English

MSc Programme Requirements

A student is supposed to complete the following requirements: courses (includes both core-courses and electives), term project, and MSc Degree project.

- MSc in CS and BDA both are 80 credit post graduate degree programmes conducted in 4 semesters over a period of 2 years. Each credit accounts for 15 lecture hours, or 30 supervised lab hours.
- The student is required to accumulate 80 credits towards qualifying for the award of degree. To appear in the end-sem examination the student must possess $\geq 75\%$ attendance in each of the courses.
- Student's performance is evaluated through assignments, unit test, midterm and semestral exam in each of the theory courses. In practical/lab courses the student is evaluated through lab assignments. In Project, the students are evaluated based on presentation and written reports.
- In each course, the typical weightage for assignments, unit test, midterm and semestral exams are 15%, 10%, 25% and 50% re-

spectively. These ratios, however, may be changed by the course instructor.

2.3 Ph.D. in Computer Science

The admissions for Ph.D. programme are open throughout the year. Important points related to the programme are given below:

- a) Candidates for admission to the Ph.D. programme shall have a Masters degree or a degree declared equivalent to the Masters degree by the corresponding statutory regulatory body of the affiliating University, with at least 60% marks in aggregate or having a CGPA of 7/10 or an equivalent degree 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.
- b) A relaxation of 5 percentage points, or an equivalent relaxation of grade, may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/Differently-abled and other categories of candidates as per the decision of the UGC from time to time, or for those who had obtained their Masters degree prior to 19th September, 1991. The eligibility marks of 60% (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible based only on the qualifying marks without including the grace mark procedures.
- c) Ph.D. programme shall be for a minimum duration of three years, including course work and a maximum of six years from the date of admission (i.e. enrolment).

- d) Extension beyond the above limits will be governed by the relevant clauses as stipulated in these Regulations.
- e) The university shall admit a Ph.D. student through an entrance test followed by an interview. The students who have cleared UGC/CSIR (JRF) Examinations / NET / SET / SLET /GATE or have obtained DST INSPIRE Fellowship /Teacher fellowship or have passed equivalent examinations or passed the M.Phil./ M.Tech / M.D/ M.E./ M.Pharm or equivalent examination shall not be required to appear at the Ph.D. entrance test.
- f) The credit assigned to the Ph.D. course work shall be of 16.The course work shall be treated as prerequisite for Ph.D. preparation. A minimum of four credits shall be assigned to one or more courses on Research Methodology which could cover areas such as quantitative methods, computer applications, research ethics and review of published research in the relevant field, training, field work, etc. Other courses shall be advanced level courses preparing the students for a Ph.D. degree.

Major research areas include but not limited to:

Computational Geometry, Design of Algorithms, Combinatorial Optimization, Complexity Theory, Computational Geometry and Applications, Facility Location Problems, Graph Theory, Oriented Graph Coloring, Robot Motion Planning, Geometric Graph Theory and Applications, Discrete Mathematics, Algorithms: Sequential, Parallel, On-line and Approximation, Pattern Recognition, Computer Vision, Image Processing, Data Modelling, Machine Learning, Deep Learning, Optimisation etc.

2.4 Dress Code & Attendance

The students must follow a proper dress code (shirt and trouser) and maintain an overall acceptable and decent etiquette (in speech, and action) while on campus.

A student is expected to have at least 75% attendance in all the courses he has enrolled in.

2.5 Conduct and Discipline

It may be noted that this institute has zero-tolerance policy towards severe breach of discipline. Ragging in any form is strictly banned, and as it goes against the honour code of the University, it is treated as a serious offence. Any violation of this rule will be treated with strict disciplinary action.

If it is found later that at the time of admission that the student and/or his guardian concealed certain facts that were requested by the institute or submitted false information, the candidature of the student may be cancelled.

Students must cooperate with the authorities in maintaining the sanctity and serenity of the place by practising a perfectly disciplined life for their own benefit. Any form of violation on campus will initiate disciplinary action which may even lead to termination of the student from the institution.



3. Lab Infrastructure

RKMVERI is a member institution of the National Knowledge Network (NKN), which provides us Gigabit Internet partnering with BSNL. The various units such as Academic Quarters, Hostels, and Guest Houses are internetworked by campus wide lan. Besides Hostels the rest of all the locations have uninterrupted Wifi access.

The Belur Main Campus has state-of-the-art labs interconnected by a Gigabit LAN. The list with the infrastructure details is as follows:

1. Fully airconditioned Big Data Lab equipped with high-end workstations setup with the sponsorship of Tata Consultancy Services Ltd.
2. Fully airconditioned Machine learning lab equipped with state-of-the-art workstations, setup with the sponsorship of Indian Oil



Big Data Lab



Machine Learning Lab

Corporation Ltd.

3. The department has a dedicated multi-core server for research purposes.

GPU Resources:

Hi-Performance Computing (HPC) cluster is equipped with latest GPUs such as NVidia A100, NVidia Quadro GV100, NVidia GeForce RTX 2080 & 3080

- GPU servers powered by Asus RTX 2080 Ti graphics card
- GPU servers powered by founder's edition NVIDIA RTX 3080
- HP Z8 workstation with the latest Nvidia Quadro GV100 graphics Card and 64GB RAM

These HPC machines are available 24×7 hrs for remote access for the department students to run Vision, AI, and ML related projects. Using the wake-on-lan feature the servers are optimally powered by the students themselves from remote.



4. Faculty

List of faculty members in the department of computer science along with their areas of interest & specialisation:

4.1 Inhouse Faculty

Sarvottamananda, Professor [PhD, IIT-Kanpur (India)].

– *Vice Chancellor* of the institute.

– Research interests: *Computational Geometry, Center-points, Intersection Radii.*

Subir K. Ghosh, Professor [PhD, TIFR/University of Bombay (India)].

– *Fellow of Indian Academy of Sciences.*

– *Ex-Professor of TIFR-Bombay (India).*

– *Adjunct Professor of IIT-Kharagpur (India).*

– *Visiting Professor of NBHM (National Board for Higher Mathematics).*

– *Research interests: Computational Geometry and Applications, Robot Motion Planning, Geometric Graph Theory and Applications, Discrete Mathematics, Algorithms: Sequential, Parallel, On-line and Approximation.*

Dhyanagamyanda, Adjunct Professor [PhD, Indian Statistical Institute (India)]

– *Research interests: Graph Theory, Graph Coloring.*

Shastravidyananda, Assistant Professor [M.Tech (CS), Jadavpur University, Kolkata (India)]

– *Research interests: Computational Geometry, Data Structures, Algorithms*

Sudipta Das, Assistant Professor [PhD, IISc-Bangalore (India)].

– *Post-doc from ISI-Kolkata (India).*

– *Research interests: Reliability, Stochastic Processes, Data Analytics, Real Time Systems.*

Vidyapradananda, Assistant Professor [PhD, Penn State University (USA)].

– *Research interests: Operations Research, Optimization*

Punyeshwarananda, Assistant Professor, HoD [PhD, University of Queensland (Australia)].

– Research interests: *Image Processing, Pattern Recognition, Machine Learning, Embedded Systems*

Joydeep Mukherjee, Assistant Professor [PhD, Institute of Mathematical Sciences-Chennai (India)].

– Research interests: *Graph Theory, String Graphs, Computational Geometry*

Soumitra Samanta, Assistant Professor [PhD, Indian Statistical Institute - (India)].

– Research interests: *Data Science, Machine Learning, Computer Vision and Chem-informatics*

Br. Tamal, Assistant Professor [PhD, University at Buffalo (SUNY Buffalo), NY (USA)].

– ex-Lecturer, University of Rochester, USA

– Research interests: *Artificial Intelligence, Machine Learning, Decision Theory, Database Systems, Networking, Computer Security*

4.2 Adjunct Faculty

Naveen Narisetty, Adjunct Professor [PhD, University of Michigan (USA)].

- Assistant Professor in University of Illinois, Urbana Champagne (USA).
- Research interests: *High Dimensional Data, Model Selection, Bayesian Computation, Functional Data, Quantile-based Inference, Censored Data, Data Depth.*

Sandip Das, Adjunct Professor [PhD, ISI-Kolkata (India)].

- Professor of ISI-Kolkata (India).
- Research interests: *Computational and combinatorial geometry, Graph theory and combinatorics, Algorithms.*

Sudebkumar P. Pal,

Adjunct Professor [PhD, IISc-Bangalore (India)].

- Professor of IIT-Kharagpur (India).
- Research interests: *Design and analysis of algorithms, Computational and combinatorial geometry, Graph theory and combinatorics.*

In addition to the above faculty members, there are a number of guest lecturers from reputed institutes such as ISI, IIT and from universities abroad who are invited to give classes regularly.



5. Internships, Progression & Placements

5.1 Internships

The curriculum of MSc Big Data Analytics mandates the students to carry out a 5-month degree project during the fourth semester. The degree project can be carried out through corporate internship, or academic internship in various institutes of the student's choice.

Since the inception of this programme, our students have secured paid internships at corporates such as TCS Pvt. Ltd, Dr. Reddy Labs, Tata Steel Pvt Ltd, ZS Associates, Autowiz Pvt Ltd., RS Software Pvt. Ltd., Ernst & Young, Vista Intelligence, PrediQt, etc., and have later had job offers from those companies for displaying exceptional performance during their internship.

Typical academic-internship destinations that our students secure

include: ISI, IIT Kharagpur, IIT Patna, IIT Bombay, and INRIA.

Since the programmes give strong emphasis on research by engaging the students in the study of contemporary research topics in Machine Learning and Artificial Intelligence.

As a result we could continually turn over a few students every year to pursue research in reputed institutions like IIT Kanpur, Indian Statistical Institute, CMI, IMSC and our own institute. We also have students securing research positions in KAUST Saudi Arabia, and NTU Singapore.

5.2 Placement & Progression

Year	No. of Students	Placements	PhD
2022	22	16	5
2021	32	25	3

(Students of both Big Data Analytics and Computer Science put together)

The median salary package of the selected students from current outgoing batch (2021-23) is 8 lakhs per annum.

- **Firms where our alumni are working:** Citibank, HSBC, HDFC, TCS, Ernst & Young, Abzooba Inc, Sravathi AI, Vista Intelligence, Micron, Dr. Reddy's Laboratories, Fractal, American Express, Accenture, Voxomos etc.
- **Institutes where our alumni are pursuing PhD:** IIT Kanpur, IIT Bombay, IMSc, ISI, IIIT Delhi, NISER Bhubaneswar, RK-MVERI, NUS & NTU, Singapore etc.



6. Admissions

For the latest news & updates on the admissions for MSc in Computer Science, MSc in Big Data Analytics and PhD in Computer Science programmes, please visit our website www.cs.rkmvu.ac.in.

6.1 Eligibility to Apply

Candidates (Male) who have finished studies in the below disciplines OR awaiting the results of the final exam are also eligible to apply (admission is subject to securing 60% marks in aggregate).

Admission for MSc in Computer Science & Big Data Analytics in Belur campus is open for male candidates only.

MSc Computer Science

- BSc Hons or BE/BTech in computer science, BE/BTech in any other discipline with a Diploma in computer science, or BCA from any recognized University/Institute with 60% marks in aggregate (in the case of Hons students: 60% in Hons subject) are eligible to apply.
- BSc in Mathematics may also apply

MSc Big Data Analytics

- B.Sc. (Hons.)/ MSc (or equivalent) in any of the following subjects: Mathematics, Statistics, Computer Science, Economics (with Econometrics), Physics (with Mathematics and Statistics as general subjects, preferred), Electronics, with at least 60% marks in the Hons. subjects in BSc or MSc, (or equivalent degree).
- BE/BTech/AMIE/Grad IETE in Computer Science (or allied branches like Information Technology/Electronics & Communication, Electrical, Mechanical) with first class, with an aggregate minimum of 60% marks.

6.2 How to Apply

Application forms are to be filled online. Please visit our department website: cs.rkmvu.ac.in

6.3 Fee Structure

- Academic fee (includes Fee for Tuition/Exam/Lab/ID-card, etc.) for each Semester : INR 20,000/-

- Refundable Caution Deposit : INR 3000/-

(For Newly Admitted Students) Fees payable at the time of admission : $20,000 + 3000 = \text{INR } 23,000$ /- (Admission fees must be paid within last date as mentioned in the admission instruction)

Selected candidates have to take admission by paying the requisite fees. Those who fail to take admission before the stipulated date without explicit permission from the authority will run the risk of forfeiting their admission.

6.4 Hostel Facility

Hostel facility is available for a limited number of students who are serious and willing to abide by the hostel discipline. A rather rigorous procedure is followed for selection of students with the involvement of the parents in the process for better coordination. Students have to apply separately for hostel facility during admission (Hostel Application form can be obtained from Admission office). The students selected for the hostel will be informed separately.

For details, please visit RKMVERI Belur Campus Hostel Fees



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7. Course Syllabus

A list of courses (both core and electives) offered in MSc Big Data Analytics and Computer Science programmes is given below, respectively. On certain occasions, some of the advanced topics are taught by the professors from ISI-Kolkata, and other reputed institutions.

7.1 MSc in Big Data Analytics – Course List

DA100	Computing for Data Science
DA101	Introduction to Computer Science
DA108	Programming for Data Science
DA200	Database Management Systems
DA102	Basic Statistical Methods
DA103	Linear Algebra and Linear Programming

DA104	Probability and Stochastic processes
DA105	Oracle Lab
DA106	Programming in R, Python, Java, SQL
DA107	Programming for Data Science-2
DA109	Linear Algebra and Matrix Computation
DA115	Foundations of Big Data Computing
DA210	Statistics II
DA211	Supply Chain Analytics
DA220	Machine Learning
DA224	Deep Learning
DA225	Online Learning
DA205	Data Mining
DA226	Computational Data Science
DA310	Multivariate Statist
DA320	Operations Research
DA230	Enabling Technologies for Big Data
DA311	Time Series and Forecasting
DA312	Time Series and Survival Analytics
DA330	Machine Learning-2
DA240	Introduction to Econometrics
DA241	Introduction to Finance
DA242	Introduction to Econometrics and Finance
DA243	Natural Language Processing
DA321	Operations Management
DA322	Bayesian Statistics
DA341	Applied Statistics (Res course)
DA342	Applied Machine Learning (Res course)

Project

DA300	Summer/Term Project
DA400	Msc Project.

7.2 MSc in Computer Science – Course List

Theoretical Computer Science

CS200	Automata Theory
CS201	Discrete Mathematics and Logic
CS205	Introduction to Probability
CS208	Computational Mathematics
CS202	Programming Language Theory
CS302	Graph Theory
CS244	Optimization Techniques
CS240	Enumerative Combinatoris
CS112	Foundations of Statistical Learning
CS300	Theory of NP-Completeness
CS301	Computational Complexity
CS206	Probability and Stochastic processes

Programming and Systems

CS123	Concepts of Programming Languages
CS125	Programming Skill Development Project
CS220	Object Oriented Programming using Design Patterns
CS221	Compiler Design
CS222	Theory of Operating systems
CS250	Design and Implementation of Database Management System
CS229	Android Programming for Handheld Devices
CS321	Distributed Computing Systems
CS234	Computer Architecture

Algorithms

CS110	Data Structures and Algorithms
CS210	Combinatorial Algorithms
CS216	Computer Graphics and Multimedia
CS217	Image Synthesis
CS218	Algorithm for Data Science
CS314	Parallel Algorithms
CS315	Robotics Algorithms
CS317	Multidimensional Search and Computational Geometry
CS247	Optimization for Machine Learning
CS237	Introduction to Cryptology
CS239	Quantum Computing
CS241	Design and Analysis of Algorithms
CS211	Graph Algorithms
CS212	Computational Geometry
CS214	Computer Graphics(*)
CS222	Introduction to Discrete Optimization
CS310	Advanced Data structures
CS312	Approximation and Online algorithms

Artificial Intelligence

CS246	Introduction to Artificial Intelligence
CS245	Pattern Recognition
CS230	Machine Learning
CS330	Advanced Machine Learning
CS341	Speech Recognition and Synthesis
CS342	Computer Vision
CS343	Algorithms and Networking for Computer Games
CS344	Introduction to Game Theory

Project

CS300	Summer/Term Project
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CS400	MSc Project work
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Common Courses for Skill Development

SDA001	Presentation Skill Development
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SDA002	A course on Report Writing
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SDA003	Communication Skill Development (English)
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SDA004	A Course on Public Speaking
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SDA005	Value Thinking
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Please Note:

Though all these courses have been taught in the past, this is only a tentative list and may change for the current academic year. The Department takes feedback from various sources (eg. Board of Studies, students etc.) before finalising the courses for a given semester.



Swami Vivekananda on Education

To me the very essence of education is concentration of mind, not the collecting of facts. If I had to do my education over again, and had any voice in the matter, I would not study facts at all. I would develop the power of concentration and detachment, and then with a perfect instrument I could collect facts at will.

I see it before my eyes, a nation is advanced in proportion as education and intelligence spread among the masses.

Education is the manifestation of the perfection already in man.

Education is not the amount of information that is put into your brain and runs riot there, undigested, all your life. We must have life-building, man-making, character-making assimilation of ideas. If you have assimilated five ideas and made them your life and character, you have more education than any man who has got by heart a whole library.

The secret of life is not enjoyment but education through experience.

The very reason of nature's existence is for the education of the soul; it has no other meaning; it is there because the soul must have knowledge, and through knowledge free itself.

