

INDIAN STATISTICAL INSTITUTE



PROSPECTUS 2015-16



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INTRODUCTION

The Indian Statistical Institute, known widely as ISI, was founded in 1931 by Professor Prasanta Chandra Mahalanobis. Growing out of a small Statistical Laboratory set up by Professor Mahalanobis in the Presidency College in Kolkata, the Institute soon moved into its present campus at Baranagar on the northern outskirts of Kolkata. Ever since that humble beginning, over the past eight decades, the Institute has undergone phenomenal growth and is now widely regarded as one of the leading institutions in the world as a centre for research and training in Statistics and related sciences.

In recognition of the importance of the Institute in the development and application of Statistics, the Parliament of India, in 1959, enacted the Indian Statistical Institute Act, declaring it an Institution of National Importance and empowering it to grant degrees and diplomas in Statistics. In 1995, This Act was further amended, empowering the Institute to grant degrees and diplomas also in Mathematics, Quantitative Economics, Computer Science and other subjects related to Statistics as may be determined by the Institute from time to time.

The headquarters of the Institute is located in Kolkata. However, centres of the Institute have come up over the years in other major cities. At present, the Institute has four centres operating at Delhi, Bengaluru, Chennai and Tezpur. In addition, the Institute has a branch at Giridih devoted to agricultural and sociological research and also a network of units at Coimbatore, Hyderabad, Mumbai and Pune, involved in activities related to Statistical Quality Control and Operations Research.

Most of the research and teaching activities of the Institute take place in its headquarters in Kolkata and the four centres. In Kolkata, Delhi, Bengaluru and Hyderabad, the Institute has its own campus and they are equipped with adequate hostel facility for students, residential quarters for the faculty and guest houses, and also recreational and medical facilities. The campus at Giridih has a small guest house and rudimentary hostel facilities. The relatively new centres at Chennai and Tezpur are still operating at temporary locations. However, at these centres too, the Institute is providing hostel facility for students and residential facility for faculty members. At each of these five locations, there are a large number of scientists in Theoretical and Applied Statistics, Statistical Quality Control and Operations Research, Mathematics and Economics. In Kolkata, Chennai and Bengaluru, there is also a large group of scientists in Computer and Communication Sciences and other branches of natural and social sciences.

A sizeable proportion of the students passing out of the Institute go on to build remarkably successful careers in research and academics. Some of the most eminent and leading researchers and academics in the fields of Statistics, Mathematics, Computer Science and Economics are alumni of the Institute. At the same time, students of the Institute who have gone into industry have also been extremely successful. A number of top and well-accomplished leaders in industry are also alumni of the Institute.

For many years now, the Institute has been running a very proactive on-campus placement programme. Under the supervision of a member of the teaching faculty, this programme has been very successful in providing the aspiring students, in the final years of their respective programmes, excellent placement opportunities in some of the leading organisations in various sectors of the industry. Some of the companies that have visited the Institute's campus in Kolkata for recruitment in the past few years are:

GOOGLE, GOLDMAN SACHS, CAPITAL ONE, JP MORGAN, BARCLAYS SHARED SERVICES, SAP, ERNST & YOUNG, MICROSOFT, AMERICAN EXPRESS, XEROX RESEARCH, AMD, SYNOPSYS, AMAZON, TRDDC, IBM RESEARCH LAB, MCKINSEY & COMPANY, AIG, WALMART LABS, RBS, CREDIT SUISSE, AXIS BANK, ICICI BANK, CRISIL, DELOITTE, VIACOM18, ANZ BANK, ICICI LOMBARD, HP, FICO, CITIBANK, NIELSEN, HSBC TECHNOLOGY & SERVICES, TCS INNOVATION LABS ETC.

Over the last several years, the Institute has been very actively pursuing institution-level collaboration that has led to Memoranda of Understanding (MOUs) with a number of universities/academic institutions as well as industrial organisations. These MOUs range from collaborative research to research grants for students/faculty as well as student/faculty exchange programmes. At present, the Institute has MOUs signed with the following institutions/organisations:

IBM INDIA PVT. LTD., CHENNAI MATHEMATICAL INSTITUTE (CMI), TEOCO, TEXAS INSTRUMENTS PVT. LTD., BIRSA AGRICULTURAL UNIVERSITY, SETS, HOMI BHABHA NATIONAL INSTITUTE, NATIONAL UNIVERSITY OF SINGAPORE, NORTH CAROLINA STATE UNIVERSITY, MAASTRICHT UNIVERSITY-NETHERLANDS (JOINT PHD PROGRAMME), TECHNOLOGICO AUTONOMO DE MEXICO (ITAM), TATA INSTITUTE OF FUNDAMENTAL RESEARCH (TIFR), TATA CONSULTANCY SERVICES LTD (TCS), DE BEERS INDIA PVT. LTD., DST - INDO GERMAN MAX-PLANCK CENTRE, IISCO (STEEL AUTHORITY OF INDIA LTD.), INTERNATIONAL GROWTH CENTRE, FICO, TECH MAHINDRA, BANGLADESH INSTITUTE OF DEVELOPMENT STUDIES, ECOLE POLYTECHNIQUE MASSTRO, UNIVERSITY OF PARIS DAUPHINE, THE WARWICK UNIVERSITY, INSTITUTE OF FINANCIAL MANAGEMENT RESEARCH (IFMR), MCX STOCK EXCHANGE LTD.

The Central Library of the Institute, located at Kolkata (with a network extending to two major libraries at Delhi and Bengaluru Centres and other locations of the Institute), has one of the richest collections in the country, particularly in the fields of Statistics and allied disciplines, namely, Mathematics, Economics, Computer Science, Earth Science, Life Science, Physics, Quality Control, etc. In

addition to a total volume of more than three lakhs, comprising books, bound journals, official reports/data-books, dissertations and theses, reprints, non-print materials such as CDs/floppies, microfilms and microfiches, it maintains online access to journals and all the major scientific publication databases. It has also a separate NBHM collection funded by National Board for Higher Mathematics, Department of Atomic Energy, Government of India. It is making endeavours to create institutional repositories using open-source software, facilitating access to indigenous resources across regions and increasing the visibility of such resources. As a part of the Central Library, the renovated *Amrapali* building which was the residence of the founder of the Institute, now houses the **P C Mahalanobis Memorial Museum and Archives**.

The Institute also runs the International Statistical Education Centre (ISEC), established in 1950, under the auspices of the Government of India. This Centre has been providing training in Statistics to sponsored students mainly from the developing countries of the Middle-East, South and South East Asia and the Far East and from the Commonwealth countries of Africa. The Centre also offers various short-term courses in Statistics and related subjects.

A BRIEF HISTORY OF THE INSTITUTE

The Indian Statistical Institute had its beginning in a small statistical laboratory set up by Professor Prasanta Chandra Mahalanobis in the Presidency College at Kolkata, where he was then a professor of Physics. In a meeting held on 17th December 1931 and presided over by Sir R N Mookerjee, the first President of the Institute, the Indian Statistical Institute (ISI) was formally established and Prasanta Chandra Mahalanobis was appointed the Honorary Secretary. The Institute was registered on 28th April, 1932, as a non-government and non-profit learned society under the Societies' Registration Act No. XXI of 1860. The Institute is now registered under the West Bengal Societies Registration Act XXVI of 1961, amended in 1964. The major objectives of the Institute, as stated in its Memorandum of Association, are:

- (i) to promote the study and dissemination of knowledge of Statistics, to develop statistical theory and methods, and their use in research and practical applications generally, with special reference to problems of planning for national development and social welfare;
- (ii) to undertake research in various fields of natural and social sciences with a view to the mutual development of Statistics and these sciences;
- (iii) to provide for, and undertake, the collection of information, investigations, projects, and operational research for purposes of planning and the improvement of efficiency of management and production.

With its humble start in a laboratory in the Presidency College, the Institute soon embarked upon a remarkable journey with enduring support from a number of distinguished personalities and devoted scholars in Kolkata. In the first two decades of its existence, which was a glorious chapter in the annals of Indian science and institution building, the ISI undertook a series of pioneering programmes involving application of Statistics in search of solutions to some of the urgent and live problems of the country. Such programmes included innovative projects on sample surveys of yield and land utilisation of crops, socio-economic after-effects of Bengal famine (1943-44) and problems of flood research, to name a few. Simultaneously, led by Professor Mahalanobis, path-breaking theoretical research was carried out by a very able group of young statisticians including R C Bose, S N Roy and C R Rao. These innovations and methodological research have since become classics in Statistics. All these activities brought laurels for the Institute in India as well as abroad.

Over a period of several decades since its inception, the Institute made steady strides to establish its identity as a pioneering organisation nationally as well as internationally. Some of the principal achievements of this period include

- (i) the establishment of a full-fledged research and training school in Statistics and Probability with applications in natural and social sciences,
- (ii) the publication of *Sankhyā*, the first international journal of Statistics in India,
- (iii) the inception of a National Sample Survey wing, engaging in comprehensive socio-economic data collection for the nation,
- (iv) the creation of a string of Statistical Quality Control units for promoting the quality movement at various industrial centres in the country, and
- (v) collaboration with the International Statistical Institute to train Government statisticians from Asia and Africa.

One of the most significant contributions of the institute in India's nation-building came when, in 1954, Pandit Jawaharlal Nehru, the then Prime Minister of India, entrusted Professor Mahalanobis and ISI with the responsibility of preparing the draft Second Five-Year Plan for the country. The institute established a planning wing dedicated to the formulation of the Second Five-Year Plan of India. The draft submitted by Prasanta Chandra Mahalanobis and the planning models formulated by him and his colleagues have since been regarded as major contributions to economic planning in India.

As another remarkable achievement, the Institute, in 1956, installed the first electronic computer in the country. In 1961, the ISI, in collaboration with Jadavpur University, undertook the design, development and fabrication of a fully transistorised digital computer, called ISI-JU-1, which was commissioned in 1966. The institute had established an Electronic Computer Laboratory that was responsible for developing

- (a) the first mechanical hand computing machine,
- (b) the first Analog computer,
- (c) the first Punched Card storing machine and
- (d) the first Solid State Computer in India.

The Institute, from its formative period till the recent time, received as guests many eminent scientists, including Nobel Laureates. Besides Sir Ronald A Fisher, JBS Haldane and Walter A Shewhart, the luminaries included Frederic and Irene Curie, Neils Bohr, AN Kolmogorov, PMS Blackett, JD Bernal, Joan Robinson and Genedi Taguchi. In recent times, the visit of Amartya K Sen, Robert Aumann, Lotfi A Zadeh, Joseph E Stiglitz, Sir James A Mirrlees, Eric S Maskin and SRS Varadhan, the 2007 Abel Prize winner for his contributions to probability theory and an alumnus of the institute, may be especially mentioned.

The Institute has always had its headquarters in Kolkata since its inception. Later, the Delhi Centre, initially housed within the Planning Commission premises, was started in 1974, and shifted to its present campus in 1975. The Bengaluru

Centre was conceived by Professor P C Mahalanobis during 1960s. With the Statistical Quality Control unit functioning in Bengaluru from 1956, and Documentation Research and Training Centre from 1962, Professor Mahalanobis thought of starting a centre of ISI around the mid-1960s. However, the activities of the Bengaluru Centre started in September 1978 in a rented building under the Directorship of Professor G Kallianpur. The Bengaluru Centre was formally declared as a centre of ISI in September 1996. The newly created Chennai Centre of the Institute, which came into being on 26th July, 2008, and the North-East (NE) Centre at Tezpur, Assam, which was inaugurated on July 23, 2011, are expected to carry out research in theory and applications of Statistics in the new areas of natural and social sciences. The NE Centre is also committed to cater to the statistical needs of the North-Eastern states, including training statistical personnel.

The formal empowerment of the Institute for awarding of degrees came in December 1959, when Pandit Jawaharlal Nehru piloted in the Parliament the enactment of the Indian Statistical Institute Act of 1959, which designated ISI as an **Institution of National Importance**. Its activities steadily grew, existing interests became more broad-based and a number of science units were created in the interest of live interaction between Statistics and natural and social sciences. Empowered by the Act to award degrees, the Institute introduced the Bachelor of Statistics (Honours) and Master of Statistics courses in 1960 under the guidance of Professor Mahalanobis and stalwarts like Professor Satyendra Nath Bose who was the President of the Institute for a long period of time, with the philosophy that the academic training of a statistician should encompass the basic principles of Statistics along with its theoretical and methodological development, not merely in abstract formulation, but also in relation to concrete problems arising from natural and social sciences. The Institute also introduced research programmes leading to the Ph D degree from the Institute. After the subsequent amendment of the Indian Statistical Institute Act in 1995, broadening its scope of degree-awarding, the institute introduced other degree programmes, namely, Master of Science (Quantitative Economics) (in 1996-97), Bachelor of Mathematics (Honours) (in 2000-01), Master of Mathematics (in 2003-04).

A one-year Diploma in Computer Science was started in the Institute in 1966. This was upgraded to a two-year Diploma in 1978, which evolved into the current M Tech programme in Computer Science in 1981, the first such programme in the country.

The Institute initiated the use of Statistical Quality Control and Operations Research in India in the early fifties and started developing these fields through theoretical and applied research, practical training in industry and consultancy assignments. To meet the growing needs from the industry, the institute offered a PG Diploma course in SQC & OR and also offered SQC & OR (currently ISOR) as a

specialization in the M Stat programme. The increased awareness since late eighties, that SQC & OR techniques are of immense help in the development of the industrial sector, has led to the introduction of a two-year full-time M Tech programme in Quality, Reliability and Operations Research in Kolkata in 1989. From the academic year 2014-15, two new programmes have been introduced: a two-year Master of Science programme in Quality Management Science [MS (QMS)] which is being conducted in Bengaluru and Hyderabad, and a one-year postgraduate diploma programme in Computer Applications at the Giridih branch of the Institute.

The Institute has also been offering a course leading to Associateship in Documentation and Information Science at the Bengaluru Centre since 1965-66. This course has been upgraded to a Master's level programme, called the Master of Science in Library and Information Science [MS (LIS)] since 2008-09.

CURRENT ACADEMIC PROGRAMMES

	PROGRAMME	DURATION	VENUE FOR 2015-16
Degree Programmes	B Stat (Hons)	3 years	Kolkata
	B Math (Hons)	3 years	Bengaluru
	M Stat	2 years	Delhi & Chennai
	M Math	2 years	Bengaluru
	MS (QE)	2 years	Kolkata and Delhi
	MS (LIS)	2 years	Bengaluru
	MS (QMS)	2 years	Bengaluru - Hyderabad
	M Tech (CS)	2 years	Kolkata
	M Tech (QROR)	2 years	Kolkata
Diploma/ Certificate	Part-time Course in SQC*	6 months	Bengaluru Hyderabad
	Postgraduate Diploma in Statistical Methods and Analytics	1 year	Tezpur
	Postgraduate Diploma in Computer Applications	1 year	Giridih
Fellowship	Junior/Senior Research Fellowship	6 years	Kolkata Delhi Chennai Bengaluru Hyderabad

The Institute awards Ph D/D Sc degrees for research in the fields of Statistics, Mathematics, Quantitative Economics, Computer Science, and Quality, Reliability and Operations Research (QR&OR).

* For the academic year 2015-2016, this course will be notified separately, if offered.

ADMISSION PROCEDURE

Admission to the academic programmes of the Indian Statistical Institute is based strictly on the merit of the candidates as judged from their performance in appropriate admission tests and interviews. Their past academic records may also be taken into account for this purpose. The admission tests are held at a number of centres in India. The next section gives details of scope, eligibility criteria and selection procedures for the programmes offered. If at any stage of the selection process it is found that a candidate does not satisfy the eligibility conditions, his/her application will not be processed any further. Eligibility requirements may be relaxed in some cases at the discretion of the Institute.

If a student is asked to discontinue a programme for having failed or on any disciplinary ground, he/she is not eligible for readmission to the same programme.

For some programmes, there is a provision for employers to sponsor suitable candidates employed by them. Details of this scheme are given separately under the appropriate programmes.

The decision of the Institute in all admission-related matters is final. Canvassing in any form disqualifies a candidate from being selected. The names of candidates called for interview on the basis of the written tests and also of those selected after interview are generally posted on the internet at <http://www.isical.ac.in/~admission>.

Note: Sample questions and syllabi for the Admission tests for the various programmes being offered by ISI in the current year can be downloaded from the ISI admission portal <http://www.isical.ac.in/~admission>.

RESERVATION

For admission to all its programmes (except the Research Fellowships), the Institute follows a policy consistent with the national policy on reservation for candidates from the Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC) and Physically Challenged (PC) categories. Candidates from these reserved categories also enjoy some other benefits in respect of charges, stipend, hostel accommodation and travelling allowance (details are given on <http://www.isical.ac.in/~deanweb/reservationpolicy.html>).

SC/ST and OBC candidates will be required to produce the original caste/tribe certificate issued by a competent authority in the prescribed format, available in the following:

- <http://www.isical.ac.in/~deanweb/SC-ST.pdf>
- http://www.isical.ac.in/~deanweb/OBC_Proforma.pdf

For any category of physical disability (namely, locomotor, visual, speech and hearing), benefit will be given to those candidates who have at least 40% permanent physical impairment in relation to a body part/system/extremity/extremities/whole body, etc. The candidates in this category will be required to produce a certificate issued by a competent authority in the prescribed format, given in

- http://www.isical.ac.in/~deanweb/PH_Proforma.pdf.

The candidate must produce the applicable document at the time of interview, if he/she wishes to avail of the benefits offered by the reservation policy.

ACADEMIC PROGRAMMES: SCOPE, ELIGIBILITY AND SELECTION PROCEDURE

BACHELOR OF STATISTICS (HONOURS) [B STAT (HONS)]

SCOPE

This **three-year** degree programme offers comprehensive instruction in the theory, methods and application of Statistics, in addition to several areas of Mathematics and some basic areas of Computer Science. It also offers optional courses in some other subjects as described in a subsequent section. It is so designed that, on successful completion, the students will be able to pursue higher studies in areas of Statistics and Mathematics, as well as Computer Science, Economics and allied fields, or take up careers as Statisticians in research institutions and scientific laboratories, government departments or industries. This programme is offered only at **Kolkata**.

ELIGIBILITY

In order to be eligible for admission, an applicant should have successfully completed 10+2 years of Higher Secondary Education (or its equivalent) with Mathematics and English as subjects of study.

SELECTION PROCEDURE

All applicants for this programme, except the INMO AWARDEES (see next paragraph), will have to appear for written tests comprising multiple-choice type and descriptive questions in Mathematics at the Higher Secondary level (10+2 years' programme). Based on performance in the written tests, a number of candidates are called for interviews.

The written test is **waived** for applicants who have been selected as **INMO AWARDEES** to participate in the International Mathematics Olympiad Training Camp (IMOTC) in the current year or in any previous year, based on their performance in the Indian National Mathematics Olympiad (INMO) conducted by the National Board of Higher Mathematics, Department of Atomic Energy, Government of India. Such candidates will be directly called for interviews. However, like all other candidates, such candidates are also required to apply in the prescribed application form for admission to the programme. **Merely holding an INMO Certificate of Merit from Homi Bhaba Centre for Science Education (HBCSE) will not suffice for waiver of written tests for selection to the programme.**

The final selection of candidates for admission to the programme is based on performances in the two written tests as well as the interviews (only interviews for

INMO AWARDEE applicants) and the final list of candidates selected for admission is announced after completion of all the interviews.

A candidate who has applied to the B Stat (Hons) programme shall have only one option at a subsequent stage to seek admission to the B Math (Hons) programme of the Institute. Candidates who wish to exercise this option must inform the Dean of Studies of their decisions either in writing or by sending an e-mail to admissionsupport@isical.ac.in between May 12 and May 19, 2015.

BACHELOR OF MATHEMATICS (HONOURS) [B MATH (HONS)]

SCOPE

This three-year degree programme offers comprehensive instruction in basic Mathematics along with rudimentary courses in Probability, Statistics, Computing and Physics. It is so designed that, on successful completion, the students will be able to pursue higher studies in the areas of Mathematics, Statistics, Computer Science, Mathematical Physics, etc., or take up a career in applications of Mathematics. This programme is offered only at Bengaluru.

ELIGIBILITY AND SELECTION PROCEDURE

Eligibility and selection procedure for B Math (Hons) are the same as those for the B Stat (Hons) programme described above. In fact, a common admission test is conducted for both programmes.

A candidate who has applied to the B Math (Hons) programme shall have only one option at a subsequent stage to seek admission to the B Stat (Hons) programme of the Institute. Candidates who wish to exercise this option must inform the Dean of Studies of their decisions either in writing or by sending an e-mail to admissionsupport@isical.ac.in between May 12 and May 19, 2015.

MASTER OF STATISTICS [M STAT]

SCOPE

This two-year programme offers advanced-level training in the theory, methods and applications of Statistics along with specialised training in selected areas of Statistics and allied fields. On successful completion of this programme, students will be able to pursue an academic/research career in Statistics, Mathematics, Economics, Computer Science and allied fields, depending on their chosen area of specialization. They will also be able to work competently as Statisticians and specialists in research institutions and scientific laboratories, government departments or industries. This programme is being offered this year at Chennai and Delhi.

ELIGIBILITY

In order to be eligible for admission to this programme, an applicant must have

- a three-year Bachelor's degree or a BE/B Tech degree with Statistics as a full subject, or
- a B Math degree from ISI, or
- a Post-Graduate Diploma in Statistical Methods with Applications/Statistical Methods and Analytics from ISI.

SELECTION PROCEDURE

Students with B Stat (Hons) degree from ISI are offered direct admission to this programme at Kolkata without any selection test or interview. For all other eligible candidates, including students with a B Stat (Pass) degree from ISI, selection for admission to this programme is based on performance in written admission tests and subsequent interview. Past academic record may also be taken into consideration.

Candidates finally selected will be placed in either Delhi or Chennai by the Selection Committee.

The written admission test has two parts:

- multiple-choice and/or short-answer questions in Mathematics at the undergraduate level in the first part, and
- multiple-choice and/or short-answer questions in Statistics and Mathematics at the undergraduate level in the second part, designed to assess competence in the theory and methods of Statistics and comprehension in Mathematics.

MASTER OF MATHEMATICS [M MATH]

SCOPE

This **two-year** programme offers advanced-level training in Mathematics. On successful completion of the programme, students will be able to pursue a research/academic career in Mathematics. Depending on the choice of the optional subjects, the students will also be able to work in the fields of Probability Theory and Theoretical Computer Science. It is being offered this year only at **Bengaluru**.

ELIGIBILITY

In order to be eligible for admission to this programme, an applicant must have

- a three-year Bachelor's degree in Mathematics, or

- a BE/B Tech Degree, with Mathematics as a full subject and a strong background in Analysis and Abstract Algebra, or
- a B Stat degree from ISI.

SELECTION PROCEDURE

Students with B Math (Hons) degree from ISI are offered direct admission to this programme without any selection test or interview. For all other eligible candidates, including students with B Math (Pass) degree from ISI, selection for admission to the programme is based on performance in written admission tests and subsequent interview. Academic record may also be taken into consideration.

The admission tests will comprise multiple-choice and/or short- answer type questions in Mathematics at a level corresponding roughly to the Mathematics Honours/Major of Indian universities, with special emphasis on Real Analysis, Linear and Abstract Algebra.

MASTER OF SCIENCE IN QUANTITATIVE ECONOMICS [MS (QE)]

SCOPE

This is a **two-year** advanced programme in Economics and its applications, with special emphasis on quantitative methods. On successful completion of the programme, a student will be able to pursue an academic career in Economics or take up responsible positions in various private and public sector organisations. It is offered at **Kolkata** and **Delhi**.

ELIGIBILITY

In order to be eligible for admission to this programme, an applicant must have

- a three-year Bachelor's degree in Economics/Mathematics/Statistics/Physics, or
- a B Stat degree from ISI, or
- a BE/B Tech degree with knowledge of Economics and Mathematics at the undergraduate level.

SELECTION PROCEDURE

Selection of candidates to this programme will be based on performance in written tests and subsequent interview. Academic record may also be taken into consideration. The written admission tests will comprise multiple-choice and/or short-answer questions in **both Economics and Mathematics at the undergraduate level**.

MASTER OF SCIENCE IN QUALITY MANAGEMENT SCIENCE [MS (QMS)]

SCOPE

This is a **two-year** programme in Quality Management and its applications with a special emphasis on Quantitative Methods. It also includes Dissertation in the third semester and a live Project work in the fourth semester under the direct guidance of the faculty. The course offers a flexible format for those who want to meet specific educational and career objectives. Students aspiring to undertake this programme will enhance their career options by gaining the contemporary knowledge and perspective required of Quality Analysts, Quality Managers and those who are responsible for one or more aspects of quality improvement.

The first two semesters will be offered at **Bengaluru** whereas the third semester will be at **Hyderabad**. The fourth semester, the Project work, will be at respective locations.

ELIGIBILITY

A candidate seeking admission to this course should have at least a three-year Bachelor's Degree with Mathematics as a subject. Graduate Engineers are also eligible to apply.

SELECTION PROCEDURE

Selection of candidates to this programme, including the sponsored ones, will be based on performance in written tests and subsequent interview. Academic record may also be taken into consideration. The written admission tests will comprise of multiple-choice and/or descriptive questions in **Mathematics at the undergraduate level**.

There is, however, a provision for **sponsorship** by government, semi-government, public sector undertakings, autonomous institutions and commercial/ industrial organizations, which can sponsor candidates from their establishments, provided they satisfy the eligibility requirements. The Institute, at its discretion, may apply a different criterion for such candidates. A candidate would be considered sponsored only if the employer gives him/her leave and full salary for the entire duration of the programme. Sponsored candidates will not receive any stipend and their sponsors will have to pay a tuition fee of Rs. 20,000/- per year.

MASTER OF SCIENCE IN LIBRARY AND INFORMATION SCIENCE [MS (LIS)]

SCOPE

This is a **two-year** advanced programme in Library and Information Science, with special emphasis on applications of information technology. On successful

completion of this programme, a student will be able to pursue an academic career or take up responsible positions in various private and public sector organisations in the Library and Information fields. The objectives of this programme are to develop manpower capable of

- effectively and efficiently working as information professionals at higher levels in libraries and information centres;
- design and development of information systems;
- contributing to the discipline of Library and Information Science in terms of research and teaching.

This programme is offered only at **Bengaluru**.

ELIGIBILITY

The minimum qualification for admission to this programme is a three-year undergraduate degree in any discipline.

SELECTION PROCEDURE

Selection of candidates will be based on performance in written tests and subsequent interview. Academic record may also be taken into consideration.

MASTER OF TECHNOLOGY IN COMPUTER SCIENCE [M TECH (CS)]

SCOPE

This **two-year** programme is designed to provide a balance of theoretical and professional training in Computer Science and Technology so that the students, on successful completion of the programme, may take up

- a professional career in the technology of software for computer systems or specialised application areas, or
- an academic career for further study and research in the fundamental and applied aspects of Computer Science and Technology and related disciplines.

This programme is offered only at **Kolkata**.

ELIGIBILITY

A candidate seeking admission to this programme should possess

- a Master's degree in Mathematics/Statistics/Physics/Electronic Science/Computer Science/Computer Applications/Information Technology, or
- a BE/B Tech degree or any other qualification considered equivalent (such as AMIE or, GRADIETE or, DOEACC 'B' Level).

SELECTION PROCEDURE

A candidate is admitted to this programme through written tests and interview. A few candidates may be sponsored by government, semi-government, public sector undertakings and autonomous institutions but such candidates will also be admitted through the ISI Admission Test; the Institute at its discretion may apply a different criterion for such candidates. A candidate would be considered sponsored only if he/she is granted leave and full salary by the employer for the entire duration of the course. Sponsored candidates will not receive any stipend and their sponsors will have to pay a tuition fee of ₹ 20,000/- per year.

The Admission Test typically consists of two parts:

- (i) a multiple-choice and/or descriptive test in Mathematics at the undergraduate level;
- (ii) a multiple-choice and/or descriptive test comprising the following:
 - Group A:** A test for all candidates in Mathematics at the undergraduate level and in logical reasoning.

Group B: A test, divided into five sections carrying equal marks, in Mathematics, Statistics and Physics at the postgraduate level and in Computer Science, Engineering and Technology at the B Tech level. Candidates must answer questions from any one of these sections.

A candidate with a valid GATE score above a threshold (to be decided by the Selection Committee) in his/her own subject will be directly called for interview. Final selection of such candidates would be based on their academic records and their performance in the interview. These candidates are required to apply, like all other candidates, in the prescribed application form.

MASTER OF TECHNOLOGY IN QUALITY, RELIABILITY AND OPERATIONS RESEARCH [M TECH (QROR)]

SCOPE

This is a full-time two-year programme and is offered only at Kolkata. It is intended to produce specialists in Quality Management with emphasis on Statistical Quality Control, Reliability, Operations Research, and Management Systems. Enough background on computing technologies is provided to enable the students to use technology effectively.

The programme is designed to offer adequate instruction in the theory and practice of the above disciplines. The objective is to equip students with the basic practical skills with sufficient theory to understand the principles involved in the application and to develop in them the power of systematic thinking and reasoning, practical approach and exposition. Every student, besides undergoing classroom

instruction, shall do practical work by way of case studies, dissertation or project work on live problems under the guidance of the expert faculties of ISI. On successful completion of this programme, the students may take up either

- a professional career in the field of quality engineering and management in departments of government, semi-government, public/private sector undertakings, industrial organizations, consultancy agencies, or
- an academic career for further study and research in theoretical and applied aspects of Quality, Reliability and Operations research in organizations of higher learning and research institutions.

ELIGIBILITY

A candidate seeking admission to this programme must

- be conversant with Mathematics at the graduate level;
- have secured pass marks in Physics and Chemistry at the (10+2) level;
- possess any of the following minimum qualifications:
 - (i) a Master's Degree in Statistics;
 - (ii) a Master's Degree in Mathematics with Probability and Statistics as major subjects;
 - (iii) a BE/B Tech degree or any other qualification considered equivalent;

The programme is offered in two streams:

- **Statistics Stream** for candidates with qualifications (i), (ii), or (iv), mentioned above;
- **Engineering Stream** for candidates with an undergraduate degree in Engineering or Technology as in (iii) above.

SELECTION PROCEDURE

All candidates, including sponsored ones, are admitted through written tests and interview. For admission to this course, valid GATE score is not necessary, and candidates with valid GATE scores also must take the written tests. There is, however, a provision for sponsorship by government, semi-government, public sector undertakings, autonomous institutions and industrial organisations, which can sponsor candidates from their establishments, provided they satisfy the eligibility requirements. The Institute, at its discretion, may apply a different criterion for such candidates. A candidate would be considered sponsored only if the employer gives him/her leave and full salary for the entire duration of the programme. Sponsored candidates will not receive any stipend and their sponsors will have to pay a tuition fee of ₹ 20,000/- per year.

The Admission Test consists of two parts:

- a multiple-choice and/or descriptive test in Mathematics at the undergraduate level;
- a multiple-choice and/or descriptive test for the two streams as follows:
 - Part I* (for Statistics Stream): A test divided into two sections carrying equal marks, in Statistics and Probability. Candidates must answer questions from both the sections.

Part II (for Engineering Stream): A test divided into several sections: Mathematics, Engineering Mechanics, Electrical & Electronics Engineering, Thermodynamics, and Engineering Drawing. A student has to answer questions from Mathematics section compulsorily and the remaining questions from two or more sections of his/her choice.

POSTGRADUATE DIPLOMA IN STATISTICAL METHODS AND ANALYTICS

SCOPE

The programme is intended to provide students with a comprehensive training in basic theory and applications of Statistical Methods and Analytics, in addition to some exposure to Mathematics and Computer Science. It is so designed that on successful completion, the students will be able to take up jobs as statisticians in such departments of government and industries where application of Statistics and Analytics is required.

The total duration of this programme is **one year**, and it is offered at the **ISI North-East Centre, Tezpur, Assam, exclusively for the domiciled students of the North-Eastern states of India.**

A prestigious multinational IT consultation and services company has signed a Memorandum of Understanding with ISI that gives placement opportunities to successful students.

ELIGIBILITY

In order to be eligible for this programme, an applicant must have a minimum 3-year Bachelor's degree with Mathematics/Statistics/Economics as one of the subjects and a domicile certificate of North-Eastern states from a recognized authority.

SELECTION PROCEDURE

Selection is based on the performance in written test and interview. Past academic record may also be taken into consideration. The admission test will comprise multiple-choice and/or descriptive questions on Basic Mathematics.

POSTGRADUATE DIPLOMA IN COMPUTER APPLICATIONS

SCOPE

The programme is intended to provide students with a comprehensive training in computer programming, and an introduction to the theory and applications of computer science, in addition to some exposure to Mathematics and Statistics. It is so designed that on successful completion, the students will be able to take up jobs as computer programmers and/or data entry operators in such departments of government and industries where computer programming and database management are required.

The total duration of this programme is one year, and it is offered at the ISI Giridih Branch. There is no tuition fee for the course.

ELIGIBILITY

A student must have at least a 3-year Bachelor's degree with Mathematics as one of the subjects from a recognized university/ institute.

SELECTION PROCEDURE

Selection is based on the performance in written test and interview. Past academic record may also be taken into consideration. The admission test will comprise multiple-choice and/or descriptive questions on Basic Mathematics.

JUNIOR/SENIOR RESEARCH FELLOWSHIPS (JRF/SRF)

RESEARCH FELLOWSHIPS IN STATISTICS, MATHEMATICS, QUANTITATIVE ECONOMICS, COMPUTER SCIENCE, AND QUALITY, RELIABILITY & OPERATIONS RESEARCH (QROR)

SCOPE

The Institute offers Junior Research Fellowships in Statistics, Mathematics, Quantitative Economics, Computer Science (CS), and Quality, Reliability and Operations Research (QROR). A candidate admitted as a Junior Research Fellow, and applying for registration for Ph D in the relevant discipline, will generally be required to successfully complete mandatory course-work involving at least five courses from the list of courses for that discipline. He/she is expected to engage in original research work in one of the above areas under the guidance of a supervisor appointed by the Institute, culminating in a doctoral thesis to be submitted for the Ph D degree of the Institute. Candidates making satisfactory progress towards the above goal are eligible to register for the Ph D degree of ISI. At the end of the second year, the Junior Research Fellows are assessed for the award of Senior

Research Fellowships. The total duration of Junior and Senior Research Fellowships shall not exceed six (6) years.

An enhanced Special Research Fellowship is also available for outstanding candidates in the above disciplines.

CENTRES

The names of the centres along with the respective subjects in which junior/senior research fellowships are being offered this year are given below.

CENTRE	SUBJECT
Kolkata	Statistics Mathematics Quantitative Economics Computer Science Quality, Reliability & Operations Research (QROR)
Delhi	Statistics Mathematics Quantitative Economics Quality, Reliability & Operations Research (QROR)
Bengaluru	Statistics Mathematics Computer Science [†]
Chennai	Statistics Mathematics Computer Science [†] Quality, Reliability & Operations Research (QROR)

ELIGIBILITY

Statistics

- A good academic record with M Stat, MA/M Sc or equivalent degree in Statistics, or
- outstanding mathematical maturity with B Stat/B Math, BA/B Sc or equivalent degree with Statistics as the main subject.

[†] JRF(CS) selected at Bengaluru or Chennai Centres may have to come to ISI Kolkata for completing the necessary coursework.

Mathematics

- A good academic record with M Stat, M Math, MA/M Sc or equivalent degree in Mathematics, or
- outstanding mathematical maturity with B Stat/B Math, BA/B Sc or equivalent degree with Mathematics as the main subject.

Quantitative Economics

- A good academic record with MS (QE), M Stat, MA/M Sc or equivalent degree in Statistics/Mathematics/Economics/Econometrics, or
- a BA/B Sc degree with Economics as the main subject, and outstanding mathematical maturity; or
- a Master's degree in any subject with Mathematics/Statistics as a full subject at the undergraduate level, along with sufficient knowledge of Economics; or
- a 4-year B Tech degree with sufficient coursework in Mathematics/Statistics and Economics.

Computer Science

- A good academic record with ME/M Tech or equivalent degree in Electronics/Telecommunication/Radio Physics/Computer Science/Electrical Engineering/ Microwave Communications/ Information Technology/ Bioinformatics/Biotechnology with Mathematics as a compulsory subject, or
- a good academic record with M Sc/MCA/MA or equivalent degree in Physics/Mathematics/Applied Mathematics/Statistics/Electronic Sciences/Computer Science/ Atmospheric Science/ Information Technology/ Bioinformatics/ Biotechnology with Mathematics as a compulsory subject at the graduate level, or
- a BE/B Tech or equivalent degree in the above subjects with outstanding results.

Quality, Reliability & Operations Research (QROR)

- A good academic record with M Tech/ME/MS/M Phil or equivalent degree in Quality/Reliability/Operations Research, or
- a good academic record with M Stat/M Sc/MA or equivalent degree in Mathematics/Statistics/Physics with Mathematics as a compulsory subject at the graduate level, or
- a BE/B Tech or equivalent degree in the above subjects with outstanding results.

SELECTION PROCEDURE

Subject to the eligibility criteria being satisfied, the selection of candidates for this programme is strictly based on merit as judged by performance in Admission Test and interview. Past academic record may also be taken into consideration.

Note: For an applicant who has obtained a Master's degree from ISI at most two years earlier (excluding the year of application), and has secured at least 75% in the aggregate without having taken a back-paper or compensatory examination in any course during the entire programme, the written test will be waived, and he/she will be called directly for interview by the corresponding JRF selection committee. However, such candidates are also required to apply, like all other candidates, in the prescribed application form.

Note: Candidates who have been awarded a Junior Research Fellowship in the afore-mentioned research areas by NBHM/CSIR/UGC/ICMR/DST/DBT based on a nationally conducted written Admission Test, are also required to clear the JRF admission test or an equivalent separate test conducted by the relevant JRF selection committee of the institute, if they wish to obtain a Ph D degree from ISI.

CURRENT RESEARCH INTERESTS AT DIFFERENT CENTRES

KOLKATA

Statistics: Asymptotic Theory in Statistics, Decision Theory, Statistical Inference: parametric, non-parametric and semi-parametric, Bayesian Analysis, Model Selection, Resampling Plans, Sequential Analysis, Sequential Plan, Multivariate Analysis, Parametric/Non-parametric Regression Analysis, Robustness, Minimum Distance Methods, Discrete and Categorical Data Analysis, Linear Models, Parametric/Nonparametric Discriminant Analysis, Biostatistics, Environmental Data Analysis, Survival Analysis, Reliability, Directional Data Analysis, Growth Curve Modelling, Exploratory Data Analysis, Ranking and Selection, Constructional and Combinatorial Aspects of Designs, Optimal Designs, Sampling Theory and Surveys, Small Area Estimation, Inference in High Dimensional Models. Applications of Statistics in Geology, Molecular Biology, Human Genetics, Social Sciences and Industrial (Quality) Engineering; GIS Applications, Statistical Computation, Cryptology, Statistical Pattern Recognition, Image Analysis, HIV/AIDS Modelling. Clinical Trial, Majorisation, Brain Mapping.

Mathematics: Functional Analysis, Geometry of Banach Spaces, Algebraic and Differential Topology, Symplectic Topology, Transformation Groups, Harmonic Analysis, Commutative Algebra and Affine Algebraic Geometry: Projective Modules and Euler Class Groups, Affine Fibrations, Locally Nilpotent Derivatives and allied areas, Combinatorics, Graph Theory, Mathematical Logic, Set Theory and

Descriptive Set Theory, Spectral Theory of Differential Operators, Noncommutative Geometry, Cryptology, Stochastic Processes, Probability Inequality, Large Deviations, Stochastic Calculus, Financial Mathematics, Markov Chains, Diffusion, Limit Theorems, Stochastic Approximations, Random Matrices, Extreme Value Theory, Heavy Tails and Long Range Dependence.

Quantitative Economics: Microeconomics, Macroeconomics, International Trade, Development Economics, Welfare Economics, Game Theory, Voting Theory, Contract Theory, Industrial Organisation, Financial Economics, Finance, Convergence, Social Choice, Political Economy, Public Economics, Economic Growth, Indian Economic Problems, Agricultural Economics, Environmental Economics, Time Series Econometrics, Financial Econometrics, Empirical/Applied Econometrics, Poverty and Inequality, Polarisation, Experimental Economics, Economics of Conflict, Public Choice, Social Economics, Analytical Marxism, Theories of Distributive Justice.

Computer Science: Computer Networks-*ad hoc*, Wireless Sensor, Wireless Mesh, UMTS Network Design; Parallel and Distributed Computing, Mobile Computing, Cluster Computing, Parallel/Distributed Architectures and Algorithms; Nanotechnology and Gigascale Integration, Electronic Design Automation Algorithms and Testing, Biochips and Nano-biosystems, Intellectual Property Protection of SoCs, Quantum Computing, Fault Tolerance; Computational Geometry, Graph Theory, Combinatorial Optimisation, Algorithms and Computational Complexity; Computational Molecular and Systems Biology, Bioinformatics; Pattern Recognition, Machine Learning, Artificial Intelligence, Web Intelligence and Web Mining, Social Network Analysis, Text Mining, Data Mining, Information Retrieval, Natural Language Processing, Computational Linguistics; Computer Vision, Cognitive Vision, Digital Document Processing, Image and Video Processing, Content-based Image Retrieval, Computer Graphics, Biomedical Image Processing, Video Surveillance; Speech and Signal Processing; Artificial Neural Nets, Case Based Reasoning, Evolutionary Computing, Fuzzy Sets and Systems, Fuzzy Control, Granular Computing, Soft Computing, Computing with Words, Rough Sets, Swarm Intelligence, DNA-Computing; Mathematical Morphology, Fractals, Wavelets; Artificial Immune System, Neurodynamics; Digital Watermarking; Atmospheric Science, Remote Sensing; Theory and Applications of Cellular Automata; Cryptology, Coding Theory, Information Theory, Perception Engineering, Computational Neuroscience.

Quality, Reliability & Operations Research (QROR): Business Analytics and Data Mining, Six Sigma and Lean Six Sigma, Mathematical Programming, Reliability Models, Process Control, Process Optimisation.

DELHI

Mathematics: Algebraic groups over arbitrary fields. Algebras with involutions. Galois cohomology. Non-associative algebras and exceptional algebraic groups. Quadratic forms. Quantum groups, non-commutative geometry, operator algebras, KK-theory. Analysis and geometry of matrices and linear operators. Generalised inverse of a matrix. Matrices and graphs. Number theory, Diophantine equations, irreducibility of polynomials, prime numbers. Cryptography. Combinatorial optimisation problems. Extreme value theory. Interacting particle systems. Markov chains. Markov processes and martingale problems. Percolation theory. Random graphs, probability on trees. Random walks in random environments. Stochastic differential equations. Stochastic filtering theory. Stochastic control. Urn models.

Statistics: Computational biology. High-dimensional data. Penalised regression. Resampling methods. Reliability. Non-linear regression. Non-parametric inference. Statistical computing. Statistical graphics. Statistical signal processing. Surrogate data. Survival analysis.

Quantitative Economics: Optimisation Theory, Game Theory and Applications, Mechanism Design, Auction Theory, Choice Theory, Industrial Organisation, International Trade and Finance, Macroeconomic Theory, Growth Theory and Empirics, Applied Econometrics, Political Economy, Empirical and Theoretical Development Economics, Economics of Education, Health Economics, Agricultural Economics, Environmental and Natural Resource Economics, Experimental Economics, Economics of Terrorism and Conflict.

Quality, Reliability & Operations Research (QROR): Complementarity Problems, Game Theory, Design of Experiments.

BENGALURU

Mathematics: Algebraic Geometry, Algebraic Groups, Coding Theory, Ring theory, Operands, Finite Geometry, Finite Groups, Buildings, Number Theory, Topology, Combinatorial Topology, Complex geometry, Differential geometry. Probability Theory, Stochastic Processes, Diffusion Processes, Reflected Diffusion, Martingale problems, Interacting particle systems, Probability measures on groups. Functional Analysis, Geometry of Banach spaces, Operator Theory, Operator Algebras, Quantum Probability, Hilbert Modules.

Computer Science: Mathematical Morphology, Digital Geometry, Earth Systems Science, Spatial Informatics, Theoretical GISci and Geocomputation, Satellite Remote Sensing Data Analysis, Digital Image Processing, Digital Geographics, Modeling the behavior Complex Terrestrial Systems via Chaos and Bifurcation

Theories, Fractals and Multifractals. Neuroinformatics: Interface between brain science and computer science from signal processing, information theory and coding theory point of view with realistic applications in experimental and clinical sciences. Equal emphasis is on quantitative science and medical science. Information Granulation, Granular Computing, Pattern Recognition, Machine Learning, Image and Video Processing, Soft Intelligence Computing, Computational Intelligence.

Quantitative Economics: Development economics, Agricultural economics.

HYDERABAD

Quality, Reliability & Operations Research (QROR): Operations Research and Mathematical Modeling.

CHENNAI

Statistics: Quantitative Finance, Reliability, Survival Analysis.

Mathematics: Complex analysis, Mathematical Logic, Game theory.

Quality, Reliability & Operations Research (QROR): Semidefinite Linear Complementarity Problems, Stochastic Games, Optimisation, Cooperative games, Reliability and Operations Research.

Theoretical Computer Science: Cryptography, Graph theory, Algorithms, Logic and Games, Formal epistemology.

JUNIOR/SENIOR RESEARCH FELLOWSHIPS IN OTHER SUBJECTS

SCOPE

The Institute also offers Junior/Senior Research Fellowships in several areas of the Natural Sciences and the Social Sciences. However, candidates working for Ph D in any area other than the five mentioned in page no. 20, need to register with other Universities/Institutes for their Ph D degree. A student is initially admitted as a Junior Research Fellow. After two years of satisfactory progress including successful completion of mandatory course work, Junior Research Fellows are assessed for the award of Senior Research Fellowships. The combined duration of the Junior and Senior Research Fellowships is six years. The areas in which the Institute wants to recruit JRFs this year and the respective eligibility conditions for applying for admission are as follows:

Physics and Applied Mathematics: Quantum Mechanics, Quantum Information, Condensed Matter Physics, High Energy Physics, Quantum Field Theory, Cosmology and Astrophysics, Nonlinear Dynamics.

Eligibility: A consistently good academic record with M Sc in Physics/Mathematics/Statistics.

Agriculture and Ecology: Soil microbiological dynamics in different rice ecosystems, Phytonematode problems of rice, Development of natural food preservatives.

Eligibility: A good academic record with M Sc in Biotechnology/Applied Microbiology/Plant Genetics *or* M Sc in Entomology/Plant Pathology/Botany/Ecology/Nematology/Zoology (desirable prior experience in plant nematological work) *or* M Sc in Microbiology/Botany (with specialization in Microbiology)/Biochemistry.

Biological Anthropology: Health Statistics, Health Behaviour, Health and Nutrition, Health and Socio-economic Concomitants, Environmental Health Hazards, Health and Well-being in Urban Elderly Women.

Eligibility: M Sc in Anthropology with first class and with specialization in Physical/Biological Anthropology.

Psychology: Cognitive Psychology, Health Psychology, Organizational Psychology, Rural Psychology, Personality.

Eligibility: M A/M Sc in Psychology/Applied Psychology.

Geology: Sedimentology and Stratigraphy, Geomorphology, Quaternary Geology, Vertebrate Paleontology, Structural Geology and Tectonics.

Eligibility: A consistently good academic record with M Sc in Geology or equivalent.

Sociology: Agrarian Studies/Peasant Studies

Eligibility: A good academic record with Master's degree in Sociology/Social Anthropology/Economics.

Library and Information Science: Semantic Web, Data Repositories

Eligibility: A consistently good academic record with first or high second class in MS (LIS) awarded by ISI or Associateship in Documentation and Information Science of ISI or NISCAIR/INSDOC or its equivalent degree (such

as Master's degree in Library and Information Science from any University) with at least 55% marks in undergraduate programme.

Development Studies: Agriculture and Rural Development, Labour Studies, Village Studies, Gender Studies, Statistical Databases.

Eligibility: A good academic record with Masters or M Phil degree in Development Studies, Sociology, Economics, Agricultural Economics, Political Science or any equivalent degree.

CENTRES

The names of the centres along with the respective subjects in which research fellowships in other subjects are being offered this year are given below.

CENTRE	SUBJECT
Kolkata	Physics and Applied Mathematics Agriculture and Ecology Biological Anthropology Psychology Geology
Bengaluru	Library and Information Science Development Studies
Giridih	Agriculture and Ecology Sociology

SELECTION PROCEDURE

Subject to satisfying the eligibility criteria, the selection of candidates for JRF is strictly based on merit as judged by their performance in Admission Test and interviews. Past academic record may also be taken into consideration.

Note: Candidates who have been awarded a Junior Research Fellowship by NBHM/CSIR/UGC/ICMR/DST/DBT based on a nationally conducted written Admission Test, may also be required to clear the JRF admission test or an equivalent separate test conducted by the relevant JRF selection committee of the institute.

DOCTORAL DEGREES

DOCTOR OF PHILOSOPHY [PH D]

The degree of Doctor of Philosophy is awarded to a candidate for original contribution in a chosen field of research in the areas: Statistics, Mathematics,

Quantitative Economics, Computer Science, and Quality, Reliability & Operations Research (QROR). For this purpose, it is necessary for any candidate to register for this degree under a supervisor and subsequently submit a thesis embodying his/her research work for evaluation by a panel of examiners.

Eligibility conditions for registration as a candidate for the Ph D degree of Indian Statistical Institute are available on the webpage <http://www.isical.ac.in/~deanweb/phdrules.html>.

All correspondence regarding registration and other matters connected with Ph D degrees may be addressed to the Convener of the Ph D-D Sc Committee of the concerned discipline at the address: **Indian Statistical Institute, 203, B T Road, Kolkata 700 108.**

DOCTOR OF SCIENCE [D SC]

This is an award for outstanding published work.

ELIGIBILITY

The D Sc degree is awarded only in exceptional cases on the basis of outstanding published work. Only those who satisfy one of the following requirements are considered for the award.

- (i) B Stat (Hons)/B Math (Hons) degree or the Statistician's diploma of the Indian Statistical Institute and at least eight years of independent research work in Statistics.
- (ii) M Stat degree or Certificate of successful completion of the Two/ Three-year Advanced Statistician's Course of the Indian Statistical Institute and at least four years of independent research.
- (iii) Ph D degree of the Indian Statistical Institute and at least two years of subsequent research.
- (iv) At least eight years of research work in the field of Statistics after the Bachelor's degree of a recognized university or institute of which at least one year of work must be at the Indian Statistical Institute.

All correspondence regarding registration and other matters connected with D Sc degrees may be addressed to **Convener, Ph D-D Sc Committee, Indian Statistical Institute, 203, B T Road, Kolkata 700 108.**

OTHER INFORMATION FOR PROSPECTIVE STUDENTS

STUDENTS' BROCHURE

Details of the courses along with the rules and regulations pertaining to the academic programmes of the Institute are given in the Students' Brochure. Usually, each student is supplied with a copy of the current brochure at the time of admission. A periodically updated version of the Students' Brochure is also available on the internet at <http://www.isical.ac.in/~deanweb> in a downloadable PDF format.

STIPENDS, FELLOWSHIPS AND ALLOWANCES

All non-sponsored students and research fellows admitted to various programmes, except the Postgraduate Diploma in Computer Applications, receive stipends, fellowships and contingency/book grants as given below. Non-sponsored candidates are not required to pay any tuition fee for any of the programmes. Stipends are granted in the first instance for one semester/academic year only. They are renewed periodically if the progress of the student is found satisfactory. **Stipend/Fellowship granted to a student may be reduced or completely withdrawn if the academic progress, attendance in class, or character and conduct of the student are not found satisfactory.** Details of the rules pertaining to this are available in the appropriate Students' Brochure. Students leaving in the middle of a course have to refund the stipend/contingency grant received, if any. At the end of each year/semester, prizes are also awarded for outstanding performance in examinations.

Research Fellows with ME/M Tech or equivalent will be entitled to enhanced junior and senior research fellowships.

A Special Research Fellowship of ₹ 20000 per month (JRF-level)/₹ 24000 per month (SRF-level) may be awarded to outstanding candidates in each of the following subjects: (i) Statistics, (ii) Mathematics, (iii) Computer Science, (iv) Quantitative Economics, and (v) Quality, Reliability & Operations Research.

Stipends and contingency grants for all research fellowships are likely to be enhanced soon.

PROGRAMME	Stipend/Fellowship Per month (₹)	Contingency/book grant per year (₹)
B Stat (Hons)/B Math (Hons)	3000	3000
M Stat/M Math/MS(OE)/ MS(LIS)/MS(QMS)	5000	5000
M Tech (CS)/M Tech (QROR)	8000	5000
Post-Graduate Diploma in Statistical Methods and Analytics	2000	2000
Junior Research Fellowship (JRF)	25000/28000 [†] + HRA as per rules	28000
Senior Research Fellowship (SRF) [§]	28000/32000 [†] + HRA as per rules	28000
Special Research Fellowship	32000/36000 + HRA as per rules	100000

Fellowships marked in red are as revised with effect from 01.10.2014.

DISCIPLINARY POLICY

Every student of the Institute is expected to observe the normal discipline of the Institute and shall not indulge in cheating in the examinations, unruly behavior or any other act of indiscipline or unlawful/unethical/indecent behaviour. There are also specific attendance requirements that the students are expected to meet, details of which are mentioned in the **Students' Brochure**. Violations of these are likely to attract punishments such as withdrawal of stipend, withholding of promotion/award of degree, and/or expulsion from the hostel/Institute.

Ragging is banned in the Institute. If any incident of ragging comes to the notice of the authorities, the concerned student will be given an opportunity to explain his/her action(s), and if the explanation is not found to be satisfactory, he/she may be expelled from the institute. The punishment may also take the shape of

- (i) suspension from the Institute for a limited period,
- (ii) suspension from classes for a limited period,
- (iii) withholding of stipend/fellowship or other benefits,

[†] For research fellows with ME/M Tech or equivalent.

[§] after two years as JRF

- (iv) withholding of results,
- (v) suspension or expulsion from hostel.

Local laws governing ragging are also applicable to the students of the Institute.

HOSTEL

The Institute has hostels for the students in its premises in Kolkata, Delhi, Bengaluru, Chennai, Hyderabad, Tezpur. The campus at Giridih also has rudimentary hostel facilities. However, it may not be possible to accommodate all degree/diploma students in the hostels. Limited medical facilities are available free of cost at all campuses.

PLACEMENT OF STUDENTS

Students who have undergone the B Stat (Hons), B Math (Hons), M Stat, M Math, MS (QE), M Tech (CS), M Tech (QROR) and other degree, diploma/certificate courses of the Institute and those having the Ph D degree of the Institute are now well placed in government and semi-government departments, public and private sector undertakings, industries and research/educational institutions, both in India and abroad. Most of the students of the Institute get employment offers or admission to some Ph D programmes even before they complete the qualifying degree examinations.

There is a Placement Committee in Kolkata, which arranges campus interviews by prospective employers. Campus interviews are also organised at the Delhi and Bengaluru Centres.

EXAMINATION, RULES FOR PASSING AND PROMOTION

EXAMINATIONS

There are two examinations in each course in all programmes: **mid-semester** and **semester** (final). The composite score in a course is a weighted average of the scores in the mid-semester and semester examinations, class tests, home-assignments, practical record-book, project work, etc. (announced at the beginning of the semester).

The minimum composite score required for passing a course (including a non-credit course) is 35%, except for the core courses (Project-I, Project-II, Dissertation, OR-I, SQC-I and Reliability-I) in M Tech (QROR) and (Project, SDM-1, SPC, OR-1, SDM-2, IE, OR-2, SS) in MS (QMS), for which it is 45%.

If the composite score of a student falls short of 45% in a credit course, or 35% in a non-credit course the student may take a **back-paper** examination to improve the score. At most one back-paper examination is allowed in a particular course. The maximum score a student can secure in a back-paper examination is 45%. The maximum number of back-papers that can be taken in any given year of a programme is specified in the Students' Brochure.

If a student misses a mid-semester or a semester or a back-paper examination due to medical or family emergencies, there is a provision for a **supplementary** examination. The student can score at most 60% in the supplementary examinations to mid-semester and semester examinations, and at most 45% in the case of a back-paper examination.

In case a student fails to secure pass marks in a course even after the results of **backpaper** examination have been declared, there is provision for a compensatory examination subject to fulfillment of certain conditions, details of which are available in the Students' Brochure.

PROMOTION

Details of rules for promotion from one year to the next year of an academic programme are given in the Students' Brochure.

A student who fails to meet the passing criteria in any given year of a programme is permitted to repeat the year, subject to a maximum of two repeat years (any one of the first two years and the final year) for the undergraduate programmes and one for all others. The final course-wise score in a year being repeated is the maximum of the scores obtained in the two years.

FINAL RESULT

If a student has passed in all the semesters and his/her conduct has been found to be satisfactory, he/she is awarded the degree in the **First Division with distinction** or **First Division**, or **Second Division** or **Pass** (in some programmes), depending upon criteria specified in the Students' Brochure.

BRIEF DESCRIPTION OF ACADEMIC PROGRAMMES

For all the regular degree courses, each academic year is divided into two semesters separated by a short break. The first semester (Semester I) for all the courses usually starts in July/August and ends in November/December. The second semester (Semester II) starts in January and, for all the courses other than the two M Tech programmes and MS (QMS), usually ends in May. For the two M Tech programmes and MS (QMS), Semester II usually ends in July, after summer training for M Tech (CS) and after field training for M Tech (QROR) and MS (QMS). Classes are held on weekdays (Monday to Friday) during 9:30/10 am to 6 pm unless mentioned otherwise.

A brief account of the various courses offered by the Institute is given below. Details regarding the structure of the courses, promotion criteria, etc. can be found in the appropriate Students' Brochure at the site: <http://www.isical.ac.in/~deanweb>.

Note: The Institute reserves the right to make changes in course structure, selection procedure, etc. as and when needed.

BACHELOR OF STATISTICS (HONOURS) [B STAT (HONS)]

This three-year programme consists of a total of thirty courses distributed as five courses per semester. In addition, students who are found to lack adequate proficiency in English are required to take and pass a non-credit course in Remedial English in the first semester of the first year. The list of all the credit courses during the six semesters of the programme is given below.

FIRST YEAR

Semester I: *Statistical Methods I, Probability Theory I, Analysis I, Vectors and Matrices I, Introduction to Programming and Data Structures, Remedial English (non-credit).*

Semester II: *Statistical Methods II, Probability Theory II, Analysis II, Vectors & Matrices II, Numerical Analysis.*

SECOND YEAR

Semester I: *Statistical Methods III, Probability Theory III, Analysis III, Elements of Algebraic Structures, Elective Course I.*

Semester II: *Introduction to Markov Chains, Statistical Methods IV, Discrete Mathematics, Economic and Official Statistics and Demography, Elective Course II.*

THIRD YEAR

Semester I: *Linear Statistical Models, Parametric Inference, Sample Surveys, Statistical Quality Control and Operations Research, Elective Course III.*

Semester II: *Nonparametric and Sequential Methods, Design of Experiments, Statistics Comprehensive, Design and Analysis of Algorithms, Optional course.*

List of Elective Courses: *Microeconomics, Macroeconomics, Geology, Agricultural Science, Psychology, Introduction to Sociology, Introduction to Anthropology, Physics I, Physics II, Physics III.*

List of Optional Courses: *Resampling techniques, Statistical Methods in Genetics, Random Graphs, Percolation Theory, Differential Equations, Number Theory, Special Topics in Algorithms.*

BACHELOR OF MATHEMATICS (HONOURS) [B MATH (HONS)]

This three-year programme consists of a total of twenty nine courses. These are distributed as five courses per semester (except in semester II which consists of 4 courses). The list of the courses over the six semesters of the programme is given below. In addition, students who are found to lack adequate proficiency in English at the time of admission are required to take and pass a non-credit course in Remedial English in the first semester of the first year.

FIRST YEAR

Semester I: *Analysis I, Algebra I, Probability Theory I, Computer Science I, Writing of Mathematics (non-credit).*

Semester II: *Analysis II, Algebra II, Probability Theory II, Physics I.*

SECOND YEAR

Semester I: *Analysis III, Algebra III, Statistics I, Physics II, Optimisation.*

Semester II: *Graph Theory, Algebra IV, Statistics II, Topology, Computer Science II*

THIRD YEAR

Semester I: *Complex Analysis, Introduction to Differential Geometry, Physics III, Statistics III, Elective Subject I.*

Semester II: *Analysis IV, Introduction to Differential Equations, Physics IV, Elective Subject II, Elective Subject III.*

List of Elective Subjects: Computer Science III, Computer Science IV, Statistics IV, Statistics V, Introduction to Algebraic Geometry, Introduction to Algebraic Number Theory, Differential Geometry II, Introduction to Differential Topology, Mathematics of Computation, Introduction to Dynamical Systems, Introduction to Representation Theory, Topics in Optimisation, Combinatorics, Topics in Applied Stochastic Processes, Introduction to Stochastic Processes, Stochastic Models in Insurance, Mathematical Morphology and Applications, Elements of Statistical Computing, Introduction to Economics: Micro and Macro Economics, Themes in Development Theory and Policy, Poverty and Inequality: theory and empirics.

MASTER OF STATISTICS [M STAT]**

The M Stat programme is offered in two different streams, namely, *B-stream* and *NB-stream*. Further, the students of this programme need to do one of the following specializations in the second year:

- Advanced Probability (AP)
- Actuarial Statistics (AS)
- Applied Statistics and Data Analysis (ASDA)
- Biostatistics and Data Analysis (BSDA)
- Industrial Statistics and Operations Research (ISOR)
- Mathematical Statistics and Probability (MSP)
- Quantitative Economics (QE)

A student with a B Stat (Hons) degree from the Institute is put in the *B-stream*, while a student who joins M Stat through the admission test, is placed in the *NB-stream*, with the usual respective first-year curricula.

The first year programme for the B-stream will be held at Kolkata, while for the NB-stream, it will be held at Chennai and Delhi.

Offering of a given specialization at a particular centre is subject to the interest of the students and the availability of requisite resources. The Dean of Studies will inform the students in advance about the availability of the specializations and the respective centres. **Not all specializations may be offered at all the centres.** In case a particular specialization is not offered at a centre, a student of that centre who opts for it may be asked to study at a centre where such specialization is offered.

** The syllabus for this programme is currently under revision. The revised syllabus is likely to come into effect from the academic year 2015-16.

Each specialization has a number of prerequisites in terms of specific courses. The selection of students for various specializations in the second year will depend on students' preferences, their academic background as well as their performance in the First Year. The final selection of students for various specializations in the second year is determined by the Dean of Studies in consultation with the Teachers' Committee.

FIRST YEAR

The curriculum for the First Year consists of ten courses for the B- as well as NB-streams, as listed below. In addition, each student has also to take a course in Official Statistics offered at the end of the First Year.

B-STREAM:

Semester I: *Large Sample Statistical Methods, Measure Theoretic Probability, Sample Surveys & Design of Experiments, Applied Stochastic Processes, Statistical Inference I.*

Semester II: *Regression Techniques, Multivariate Analysis, Metric Topology & Complex Analysis, Elective I, Elective II.*

NB-STREAM:

Semester I: *Linear Models & Markov Chain, Real Analysis, Large Sample Statistical Methods, Sample Surveys & Design of Experiments, Statistical Inference I.*

Semester II: *Regression Techniques, Multivariate Analysis, Programming & Data Structures, Elective I, Elective II.*

Elective Courses: *Time Series Analysis, Discrete Mathematics, Optimisation Techniques, Measure Theoretic Probability, Metric Topology & Complex Analysis, Nonparametric and Sequential Analysis* (the last three are available only to NB-Stream students).

SECOND YEAR

Each student in the Second Year has to take a total of ten courses (five in each semester), which will include all the Compulsory Courses for his/her specialization and a certain number (as required by the specialization) of courses from the Lists of Elective Courses (details of which are available in the Students' Brochure for M Stat) for his/her specialization. The remaining elective courses, if any, can be selected from any other course offered in the second year of the M Stat programme at that centre.

The compulsory courses for all specializations offered in the second year are listed below.

1. **Advanced Probability (AP):** *Advanced Probability I, Functional Analysis, Stochastic Processes I, Stochastic Processes II.*
2. **Actuarial Statistics (AS):** *Actuarial Methods, Life Contingencies, Actuarial Models, Survival Analysis.*
3. **Applied Statistics & Data Analysis (ASDA):** *Advanced Design of Experiments, Analysis of Discrete Data, Statistical Computing, Advanced Sample Surveys, Applied Multivariate Analysis.*
4. **Biostatistics & Data Analysis (BSDA):** *Statistical Methods in Genetics I, Analysis of Discrete Data, Statistical Computing, Survival Analysis, Statistical Methods in Public Health, Statistical Methods in Biomedical Research.*
5. **Industrial Statistics & Operations Research (ISOR):** *Advanced Design of Experiments, Life Testing and Reliability, Quality Control and Its Management, Management Applications of Optimisation, Industrial Applications of Stochastic Processes, Optimisation Techniques II.*
6. **Mathematical Statistics & Probability (MSP):** *Advanced Probability I, Functional Analysis, Stochastic Processes I, Statistical Inference II.*
7. **Quantitative Economics (QE):** *Microeconomics I, Game Theory I, Econometric Methods, Macroeconomics I.*

MASTER OF MATHEMATICS [M MATH]

This programme is conducted over four semesters. A student will have to take five courses in each semester.

Compulsory Courses: *Analysis of Several Variables, Measure Theoretic Probability, Algebra I, Topology I, Linear Algebra, Complex Analysis, Functional Analysis, Algebra II, Topology II, Differential Geometry I, Differential Topology, Fourier Analysis, and Basic Probability Theory (only for non-B Stat and non-B Math students).*

Elective Courses: *Differential Equations (only for non-B Stat and non-B Math students), Graph Theory and Combinatorics, Number Theory, Commutative Algebra I, Differential Geometry II, Topology III, Partial Differential Equations, Advanced Probability, Algebra III, Representations of Locally Compact Groups, Commutative Algebra II, Advanced Number Theory, Algebraic Geometry, Algebraic Number Theory, Markov Chains, Ergodic Theory, Topology IV, Advanced Functional Analysis, Operator Theory, Set Theory, Mathematical Logic, Advanced Linear Algebra, Lie Groups and Lie Algebras, Linear Algebraic Groups, Elliptic Curves, Stochastic Processes, Game Theory, Automata Languages and Computation, Advanced Fluid Dynamics, Quantum Mechanics I, Quantum Mechanics II, Analytical Mechanics, Project I, Project II and Special Topics.*

Offering an elective course will depend on students' interest and availability of teachers. Each student **has to take at least one of the following three courses:** *Number Theory, Advanced Number Theory, Algebraic Number Theory*. The details of sequencing of the courses over the four semesters and the specific prerequisites for different courses are available in the appropriate Students' Brochure.

MASTER OF SCIENCE IN QUANTITATIVE ECONOMICS [MS (QE)]

This two-year programme consists of 8 compulsory courses and 12 elective courses, distributed over four semesters. The compulsory courses are as follows:

FIRST YEAR

Semester I: *Microeconomics I, Game Theory I, Statistics^{††}, Mathematical Methods^{††}* and one Elective Course.

Semester II: *Microeconomics II, Macroeconomics I, Econometric Methods I* and two Elective Courses.

SECOND YEAR

Semester I: *Macroeconomics II* and any four from the list of Elective Courses (including *Project*).

Semester II: Any five from the list of Elective Courses (including *Thesis*).

List of Elective Courses

Computer Programming and Applications, Econometric Methods II, Econometric Applications I, Econometric Applications II, Time Series Analysis and Forecasting, Sample Surveys: Theory and Practice, Bayesian Econometrics, Mathematical Programming with Applications to Economics, Game Theory II, Economic Development I, Economic Development II, Economic Development III, Intertemporal Economics, Modern Growth Theory, Industrial Organisation, Advanced Topics in Industrial Organisation, Theory of Planning, Social Accounting, Agricultural Economics, Public Economics, Regional Economics, International Economics I, International Economics II, Advanced Topics in International Economics, Monetary Economics, History of Economic Thought, Political Economy, Incentives and Organisations, Incentives and Regulations, Environmental Economics, Theory of Finance I, Theory of Finance II, Theory of Finance III, Comparative Systems, Individual and Collective Choice, Law and Economics, Basic Economics, Indian Economy: Selected Topics, Experimental and Behavioural Economics, The Theory of

^{††} Basic Economics or any other suitable courses in lieu of these two, for students having Mathematics and/or Statistics as major/honours subjects at their Bachelor's level.

Mechanism Design, Corporate Finance, Global Macroeconomics, Labour Economics, Project, Thesis, Selected Topics I, Selected Topics II, Selected Topics III.

Offering of an elective course will depend on students' interest and availability of teachers.

MASTER OF SCIENCE IN LIBRARY AND INFORMATION SCIENCE [MS (LIS)]

This two-year programme consists of a total of twenty credit-courses distributed over four semesters. These include colloquium, seminar and dissertation work. In addition, there are two courses in Elementary Mathematics (each carrying four credits) in the first and second semesters. However, for those who have not studied Mathematics at the plus two level, these two courses are credit-courses.

The dissertation work on an approved topic will be spread over the 3rd and 4th semesters. Evaluation of dissertation will be based on (a) the contribution by the student (original contribution or some developmental work), (b) report itself, (c) presentation in an open seminar (defense), and (d) depth of knowledge in the area.

The courses along with their sequencing over the semesters are as follows:

Semester I: *Foundations of Library and Information Science; Information Organisation (Theory and Practice); Cataloging and Metadata (Theory and Practice); Foundations of Computer & Information Technology; Library Management & Library Automation (4 credits each) and Elements of Mathematics-I (credit or non-credit).*

Semester II: *Information Sources, Systems and Services; Elements of Statistics and Research Methodology; Digital Libraries; Data Structures and Programming; Colloquium (4 credits each) and Elements of Mathematics-II (credit or non-credit).*

Semester III: *Information Storage, Retrieval and DBMS; Content Management Systems (CMS); Informetrics and Scientometrics; Web Technologies and Web-based Information Services; Seminar (4 credits each) and Dissertation.*

Semester IV: *Networking Technologies and Library Networks; Knowledge Management Systems; Semantic Web; Elective (4 credits each) and Dissertation (8 credits).*

Elective (any one of the following): *Business & Corporate Information Systems; Health Information Systems; Agricultural Information Systems, Social Science Information Systems; TQM; Data & Text Mining.*

The programme may also include any other advanced level course as recommended by the Teachers' Committee and approved by the Academic Council.

MASTER OF SCIENCE IN QUALITY MANAGEMENT SCIENCE [MS (QMS)]

This two-year programme consists of 15 compulsory courses, 2 elective courses and a dissertation in the first three semesters; and a live project work during the fourth semester. The classes for the first two semesters will be held in Bengaluru and the same for the third semester will be in Hyderabad. The project work at the fourth semester will be at the respective locations. The semester-wise list of courses is as follows:

Semester I: *Statistics for decision Making-1 (SDM-1); Statistical Process Control (SPC); Project Management; Reliability, Maintainability and Safety-1 (RMS-1); Management Information System (MIS); Operations Research -1 (OR-1).*

Semester II: *Statistics for decision Making-2 (SDM-2); Advanced Statistical Process Control (ASPC); Industrial Experimentation (IE); Reliability, Maintainability and Safety-2 (RMS-2); Operations Research -2 (OR-2).*

Elective (any one of the following): *Game Theory; Capability Maturity Models; Applied Regression Analysis; Marketing Research; Data Base Management; Pattern Recognition; Neural Network; Multivariate Data Analysis; Markov Analysis and Modelling.*

Semester III: *Trouble Shooting & Problem Solving for Quality Improvement (TS); Six Sigma - Business Excellence Strategy & Problem Solving Framework (SS); Supply Chain Management (SCM); Operations Research - 3 (OR-3).*

Elective (any one of the following): *Total Quality Management; Quality Audit; Measuring Customer Satisfaction; Software Reliability; Human Factors in Continuous Improvement.*

Semester IV: Dissertation; Project Work.

Offering of an elective course will depend on students' interest and availability of teachers.

MASTER OF TECHNOLOGY IN COMPUTER SCIENCE [M TECH (CS)]

This two-year programme is divided into four semesters. A student is required to take five courses each in the first three semesters, and two courses in the fourth semester. Apart from these seventeen courses, a student has to undergo dissertation work during the third and fourth semesters of the course. In addition, a student has to undergo, after successful completion of course work in the first and second semesters, a compulsory practical training of about eight weeks in a research institute or a public/private sector organisation under the guidance of an assigned supervisor in that institute/organisation.

Further, a student may take extra noncredit courses, at most one per semester, either on recommendation of the faculty or out of his/her own interest.

The courses of study in various semesters are as follows:

FIRST YEAR

Semester I: *Discrete Mathematics, Data and File Structures* and three courses from the List A of courses, as advised by the faculty depending on the background of the student.

List A: *Introduction to Programming, Data and File Structures Laboratory, Computer Organisation, Elements of Algebraic Structures, Probability and Stochastic Processes, Principles of Programming Languages.*

Semester II: *Computer Networks, Design and Analysis of Algorithms, Automata Languages and Computation, Database Management Systems, Operating Systems.*

SECOND YEAR

Semester III: Five electives to be selected from the List B of courses, as advised by the faculty based on the background of the student and *Dissertation* (to be continued through the fourth semester).

Semester IV: Two electives to be selected from the List B of courses given below and *Dissertation* (continued from the third semester).

List B:

- B1. Optimization Techniques
- B2. Cryptology
- B3. Advanced Cryptology
- B4. Information and Coding Theory
- B5. Advanced Algorithms for Graph and Combinatorial Optimization Problems
- B6. Multi-dimensional search and Computational geometry
- B7. Combinatorial Geometry
- B8. Topics in Algorithms and Complexity

- B9. Computational Finance
- B10. Algorithmic Game Theory
- B11. Computational Complexity
- B12. Principles of Programming Languages
- B13. Logic for Computer Science
- B14. Formal Aspects of Programming Languages and Methodology
- B15. Formal Methods in Computer Science - Selected Topics
- B16. Logic Programming and Deductive Databases
- B17. Topics in Algebraic Computation
- B18. Lambda-Calculus, Combinators and Functional Programming
- B19. Pattern Recognition and Image Processing
- B20. Digital Signal Processing
- B21. Artificial Intelligence
- B22. Internet and Multimedia Technologies
- B23. Computer Graphics
- B24. Computer Vision
- B25. Advanced Image Processing
- B26. Fuzzy Logic and Applications
- B27. Neural Networks and Applications
- B28. Advanced Pattern Recognition
- B29. Analysis of Remote Sensing Images
- B30. Document Processing and Retrieval
- B31. Data Mining
- B32. Computational Molecular Biology and Bioinformatics
- B33. Computer Architecture
- B34. VLSI Design and Algorithms
- B35. Parallel Processing: Architectures and Algorithms
- B36. Software Engineering
- B37. Compiler Construction
- B38. Distributed Computing Systems
- B39. Mobile Computing
- B40. VLSI Testing and Fault Tolerance
- B41. Software Design and Validation
- B42. Advanced Database Theory and Applications
- B43. Information Security and Assurance
- B44. Advanced Operating System
- B45. Robotics
- B46. Real-Time Systems
- B47. Advanced Web Technology/ Advanced Internet Programming
- B48. Nanotechnology and Biochips
- B49. Quantum Information Processing and Quantum Computation
- B50. Functional brain signal processing: EEG & fMRI
- B51. Selected Topics on recent developments in Computer Science as suggested by the faculty.

The Teachers' Committee determines the courses to be offered in any particular semester.

Dissertation: A student is required to work toward a dissertation on a topic assigned/approved by the teachers' committee under the supervision of a suitable ISI faculty member. The work for a dissertation should relate to a relevant problem in an area of Computer Science and/or its applications, and have substantial theoretical or practical significance. A critical review of recent advances in an area of Computer Science and/or its applications with some contribution by the student may also be acceptable as a dissertation. The work should commence at the beginning of the third semester and be completed along with the courses of the fourth semester. The dissertation should be submitted by the middle of July of the year of completion. The dissertation will be evaluated by a committee consisting of the faculty members, the supervisor and external expert(s). The student has to defend his/her dissertation in an open seminar. The dissertation is considered to be equivalent to three credit courses.

MASTER OF TECHNOLOGY IN QUALITY, RELIABILITY AND OPERATIONS RESEARCH [M TECH (QROR)]

This two-year programme is divided into two semesters each per year. The following courses are offered in the first year, covering Semester I and II.

For the Statistics Stream: (i) *Electrical and Electronics Engineering*, (ii) *SQC*, (iii) *Operations Research I*, (iv) *Programming Techniques and Data Structure*, (v) *Quality Management and Systems*, (vi) *Engineering Drawing and Workshop I* (vii) *Mechanical Engineering*, (viii) *Workshop II*, (ix) *Industrial Engineering and Management*, (x) *Reliability I*.

For the Engineering Stream: (i) *Probability*, (ii) *Statistical Methods I & II*, (iii) *SQC*, (iv) *Operations Research I*, (v) *Programming Techniques and Data Structure*, (vi) *Quality Management and Systems*, (vii) *Elements of Stochastic Processes*, (viii) *Industrial Engineering and Management*, (ix) *Reliability I*.

A ten-week Summer Internship starts immediately after Semester II examination. The summer internship will carry 100 marks which will be carried forward in Semester IV.

The following courses are offered during Semester III of the second year for both the streams:

(i) *Operations Research II*, (ii) *Industrial Experimentation*, (iii) *Reliability II*, and two elective subjects selected from the following list:

Applied Stochastic Processes and Time Series Modeling, Advanced SQC, Advanced Multivariate Analysis, Business Analytics, Six Sigma, Software Engineering, Database Management Systems.

The elective subjects to be offered will be decided by the Teachers' Committee. Any two electives have to be chosen by the students from the list of electives being offered.

In Semester IV of the second year, students have to work fully on Dissertation and/or Project.

POSTGRADUATE DIPLOMA IN STATISTICAL METHODS AND ANALYTICS

This one-year programme consists of a total of 10 courses in two semesters distributed as five courses per semester.

Semester I: *Basic Mathematics, Probability Theory, Statistical Methods, Numerical Methods & Optimization, Introduction to packages: R, S and SAS*

Semester II: *Computer Intensive Statistical methods, Regression & Time Series, Statistical Machine Learning & Statistical Finance, Clinical Trials & Actuarial Method, Project* (Project work may include topics from big data technology).

All students are required to spend one week at the headquarters of the institute (Kolkata) at the end of Semester I.

POSTGRADUATE DIPLOMA IN COMPUTER APPLICATIONS

This one-year programme consists of a total of 10 courses in two semesters distributed as five courses per semester.

Semester I: *Discrete Mathematics & Statistics, Introduction to Computer Architecture & Systems Software, Introduction to Computer Programming, Database Management Systems, Operating Systems*

Semester II: *Object Oriented Programming, Web Technology, Software Engineering, Computer Networks, Project*

OTHER COURSES OFFERED AT ISI

PART-TIME COURSE IN STATISTICAL QUALITY CONTROL^{††}

SCOPE

This course is intended to provide intensive training in the theory and practice of SQC. Emphasis is on equipping the students with the basic practical skills in SQC approach with sufficient theory to understand the principles involved, and to develop in them the power of systematic thinking, practical approach and exposition. The course is offered at Bengaluru and Hyderabad. However, it is not offered at a centre in a session unless at least 10 selected candidates are enrolled for it.

DURATION

The course is held twice a year and extends over a period of 6 months: January-June and July-December. Classes are usually held on five days a week in two sessions of one hour duration each commencing at 1800 hours or at the week-ends with four hour sessions each day on Saturday and Sunday.

ELIGIBILITY

Admission is restricted to persons working in industrial, commercial or scientific organisations and sponsored by their organisations. Minimum educational qualifications are any one of the following:

- i. Diploma in any branch of Engineering or Technology from a recognised Institution;
- ii. Bachelor's degree (with Mathematics at the pre-university or equivalent level) from a recognised university or institution.

Candidates should normally be under 35 years of age. Candidates should possess a minimum of one year's working experience in an industrial, commercial or scientific organisation. The sponsoring organisations must ensure

- i. that their candidates will attend at least 75% of the classes,
- ii. adequate opportunities for the candidates to carry out the project work on some problem of interest to them,
- iii. facilities – such as transport for the project guide – to travel from the SQC and OR Unit to the organisation and back for supervising the project work.

^{††} This course will be notified separately if offered in 2015-16.

COURSE STRUCTURE

The course comprises lectures, practical exercises, assigned reading, home tasks, tutorials, seminars, group discussions and project studies on Statistical Methods and SQC Techniques. Project work runs concurrently outside the class hours in the candidate's own organisation.

A fee of ₹ 1500/- is charged. The course is now under review.

OTHER COURSES CONDUCTED BY THE INSTITUTE

The International Statistical Educational Centre (ISEC) of the Institute runs training programmes in collaboration with the Central Statistical Organisation (CSO) of Ministry of Statistics and Programme Implementation, Government of India. The Institute also runs a course for ISS Probationers on behalf of the CSO.

COURSES OF THE INTERNATIONAL STATISTICAL EDUCATION CENTRE (ISEC)

The International Statistical Education Centre (ISEC) is operated by Indian Statistical Institute under the auspices of the Government of India. The main purpose of the Centre is to train selected officials, teachers and research workers from developing countries of the Middle-East, South and South-East Asia and the Far-East and from the Commonwealth countries of Africa. Training is imparted in theoretical Statistics and various aspects of applied Statistics. A 10-month regular course leading to Statistical Training Diploma is held from June every year. In addition, special courses of varying durations are sometimes organised in a particular field for individuals/small groups of individuals. Facilities are also available for advanced study and research work by senior statisticians from abroad.

The courses are open mainly to Government-sponsored candidates. Further information regarding this course may be obtained from Member- Secretary, Board of Directors, ISEC, Indian Statistical Institute, 203 B.T. Road, Kolkata 700 108. The information is also available at <http://www.isical.ac.in/~isec>.

CENTRAL STATISTICAL ORGANISATION (CSO) COURSES

These courses are organised by the Central Statistical Organisation (CSO) of the Government of India, jointly with Indian Statistical Institute, and are designed to equip statistical officers and probationers of the Indian Statistical Service (ISS) with advanced statistical methods and to enable them to undertake higher responsibilities in their departments.

Further information regarding the courses may be obtained from Director General, Central Statistical Organisation, Jeevan Prakash Building, 25 Kasturba Gandhi Marg, New Delhi 110 001.

	Programme	Duration	Venue
ISEC Courses	Statistical Training Diploma (Regular Courses)	10 months	Kolkata
	Special courses	1 to 12 months	Kolkata
CSO courses	ISS Probationers' Course in Statistical Methodology	10 weeks	Kolkata and/or Delhi

APPLICATION PROCEDURE

Application to the programmes being offered by Indian Statistical Institute in the academic year 2015-16 must be done online through the Institute Admission Portal <http://www.isical.ac.in/~admission>. The only exception is the PG Diploma in Statistical Methods and Analytics (see below). For this purpose, an applicant must have access to the Internet, digital copy of his/her photograph, scanned copy of signature, an email account, Acrobat reader, and a printer for printing the admit card.

Digital images of the photograph and the signature of the applicant must be in any of the formats bmp/gif/png/jpg/jpeg, with sizes as specified below:

1. Applicant's Photo: 600 pixels (width) × 600 pixels (height), maximum permissible image size being 50KB,
2. Applicant's Signature: 800 pixels (width) × 300 pixels (height), maximum permissible image size being 30KB.

The applicant must initially register at ISI website and create a login account for this purpose, followed by the filling up of the form and upload of the photograph and signature. A *challan* will be generated with the student's particulars, the fee amount and other relevant information filled in automatically. See "Mode of Payment" (page 50) for the next step.

Once the admit card is generated, applicants will be notified in their portal or by e-mail about the generation of the admit card. They will be required to take a printout of the admit card to bring to the test centres.

Only for the *PG Diploma in Statistical Methods and Analytics* programme, the application Form and Prospectus can also be purchased from the ISI North-East Centre either in person or by post by

- (i) paying the fee in Cash at the Office of Indian Statistical Institute, North-East Centre, Tezpur University Campus, Tezpur, Assam, 784028 (between 10 am to 5 pm on all working days from Monday to Friday); or,
- (ii) sending a DD by post in favour of "ISI NORTH EAST CENTRE" payable at Tezpur, Assam from any nationalized bank. The DD must include an additional postal charge of ₹ 50.

The completed form only for this PG Diploma programme must then be sent to **The Head, Admissions 2015, Indian Statistical Institute, North-East Centre, Tezpur University Campus, Tezpur, Assam, 784028**, so as to reach not later than 31 March 2015.

Applicants from outside India are requested to contact the Dean's office at the following e-mail address: dean@isical.ac.in with subject: Admission 2015-2016.

APPLICATION FEE

- ₹ 600.00 for all applicants in the **general category** and for all JRF programmes (irrespective of reservation category)
- ₹ 300.00 for applicants belonging to **SC/ST/OBC/Physically Challenged categories**, for all programmes (excluding the JRF programmes)

Each applicant will have to pay in addition an amount of ₹ 60 towards **bank charges**.

MODE OF PAYMENT

For online application, the challan generated by the system must be taken to any branch of State Bank of India with the applicant's signature at least 2 working days after the generation of the challan. The bank will accept the application fee in cash and bank charges printed therein, fill in the branch name and code, and put in the journal number and the seal and the signature of the bank and return the applicant's copy. This copy must be retained by him/her.

Note: Bank will accept only Cash from the applicants.

GENERAL INSTRUCTIONS FOR FILLING IN THE APPLICATION FORM

Applicants are advised to study the prospectus carefully and satisfy themselves that they are eligible for admission to the course/fellowship for which they are applying. If at any stage it is found that a candidate does not satisfy the eligibility conditions or the information furnished in the application is incorrect, the application will be cancelled. Those who have completed or are due to complete the qualifying examinations for which results are not yet published, may also apply for admission; if selected, their admission to a course or fellowship will be provisional pending the announcement of results. In such cases, however, their applications will be cancelled if the final examinations are not completed before 01 July 2015. This date may be relaxed by the Institute in case of candidates with outstanding academic record and performance in the selection tests and interviews.

If a student had failed in a programme of the Institute and had been asked to discontinue, he/she is not eligible for readmission to that programme.

The following tables (nos. I-III) contain information regarding the ISI Admission Test that will be needed at the time of filling up of the application form.

Table I: Codes for ISI Admission Test Centres in 2015

Code	Centre	Code	Centre	Code	Centre
AG	Agartala	DP	Durgapur	NL	Nainital
AD	Ahmedabad	GT	Guntur	PT	Patna
BL	Balurghat	GH	Guwahati	PU	Pune
BG	Bengaluru	HY	Hyderabad	RP	Raipur
BP	Bhopal	IM	Imphal	SL	Shillong
BH	Bhubaneswar	JP	Jaipur	SG	Siliguri
CH	Chandigarh	KH	Kharagpur	SR	Srinagar
CN	Chennai	CC	Kolkata	ST	Surat
CO	Cochin	LU	Lucknow	TZ	Tezpur
DH	Delhi	MN	Mangalore	VN	Varanasi
DB	Dhanbad	MB	Mumbai	VP	Visakhapatnam
DG	Dibrugarh	NG	Nagpur		

Table II: Information about Admission Tests for Programmes being offered in 2015

Programme	Code	Forenoon (10.30hrs to 12.30hrs)			Afternoon (14.00hrs to 16.00hrs)		
		Test Subject	Test Type	Test Code	Test Subject	Test Type	Test Code
B Stat	BSTK	Mathematics	MCQ	UGA	Mathematics	Descriptive	UGB
B Math	BMTB	Mathematics	MCQ	UGA	Mathematics	Descriptive	UGB
M Stat	MSTX	Mathematics	MCQ	MMA	Math/Stat	Descriptive	PSB
M Math	MMTB	Mathematics	MCQ	MMA	Mathematics	Descriptive	PMB
MS(QE) (Kolkata)	MQEK	Mathematics	MCQ	PEA	Economics	Descriptive	PEB
MS (QE) (Delhi)	MQED						
MS (QMS)	MQMY	Mathematics	MCQ	QMA	Mathematics	Descriptive	QMB
MS (LIS)	MLIB	Quantitative Ability, Reasoning Ability	MCQ	PLA	English Language Proficiency, Basic IT, General Aptitude	MCQ	PLB
M Tech (CS)	MCSK	Mathematics	MCQ	MMA	Math/Phys/Stat/Engg/Tech/Comp Science	Descriptive	PCB
M Tech (QROR)	MQRK	Mathematics	MCQ	MMA	Stat/Probability/Math/Engg	Descriptive	POB
PG Diploma in Statistical Methods and Analytics	DSTT	Mathematics, Statistics	Descriptive	DST	No Test in Afternoon	-----	-----
PG Diploma in Computer Applications	DCAG	Mathematics, Statistics	MCQ	DCG	No Test in Afternoon	-----	-----

Table III: Information about Admission Tests for Junior Research Fellowships (JRFs) being offered in 2015

Subject	Centre	Code	Forenoon (10.30hrs to 12.30hrs)			Afternoon (14.00hrs to 16.00hrs)		
			Test Subject	Test Type	Test Code	Test Subject	Test Type	Test Code
Statistics	Kolkata	JSTK	Mathematics Statistics	<i>Descriptive</i>	STA	Mathematics Statistics	<i>Descriptive</i>	STB
	Delhi	JSTD						
	Bengaluru	JSTB						
	Chennai	JSTC						
Mathematics	Kolkata	JMTK	Mathematics	<i>Descriptive</i>	MTA	Mathematics	<i>Descriptive</i>	MTB
	Delhi	JMTD						
	Bengaluru	JMTB						
	Chennai	JMTC						
Quantitative Economics	Kolkata	JQEK	Mathematics	<i>Descriptive</i>	QEA	Economics	<i>Descriptive</i>	QEB
	Delhi	JQED						
	Bengaluru	JQEB						
Computer Science	Kolkata	JCSK	Mathematics	<i>MCQ</i>	MMA	Mathematics/ Statistics/Physics/ Electronics/Electrical Engineering/ Computer Science	<i>Descriptive</i>	CSB
	Bengaluru	JCSB						
	Chennai	JCSC						
Quality, Reliability and Operations Research	Kolkata	JQRK	Mathematics	<i>MCQ</i>	MMA	Mathematics/Statistics/ OR/SQC/Reliability/ Quality Management and Systems	<i>Descriptive</i>	QRB
	Delhi	JQRD						
	Chennai	JQRC						
Physics & Applied Mathematics	Kolkata	JPMK	Mathematics	<i>MCQ</i>	MMA	Mathematics/Physics	<i>Descriptive</i>	PHB
Agriculture and Ecology	Kolkata	JAEK	Agriculture/ Ecology/Basic Statistics	<i>MCQ</i>	AEA	Agriculture/Ecology/ Basic Statistics	<i>Descriptive</i>	AEB
	Giridih	JAEG						
Biological Anthropology	Kolkata	JBAK	Anthropology/ Statistics	<i>Descriptive</i>	BAA	Anthropology/ Statistics	<i>Descriptive</i>	BAB
Psychology	Kolkata	JPSK	Research Methodology	<i>Descriptive</i>	SCA	Psychology	<i>Descriptive</i>	SCB
Geology	Kolkata	JGEK	Mathematics/ Geomathematics	<i>MCQ</i>	GEA	Geology	<i>Descriptive</i>	GEB
Sociology	Giridih	JSOG	Sociology	<i>Descriptive</i>	SOA	Sociology	<i>Descriptive</i>	SOB
Library and Information Science	Bengaluru	JLIB	Library and Information Science	<i>MCQ</i>	LIA	Library and Information Science	<i>Descriptive</i>	LIB
Development Studies	Bengaluru	JDSB	Sociology	<i>MCQ</i>	DSA	Sociology	<i>Descriptive</i>	DSB

SUBMISSION OF APPLICATION

Applications must be submitted by **03 MARCH 2015**. Last date of making payment at any branch of the State Bank of India is **10 March, 2015**.

ADMIT CARD

For online applicants, after the applications are processed, the Admit Card for the Admission Test, with the Registration Number, will be generated. Applicants will receive a link containing the above information in his/her account and will need to take printouts of the same. In all subsequent correspondence, the applicant should quote the Registration Number without which no correspondence will be entertained.

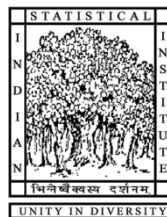
The Admission Test will be held on Sunday, May 10, 2015 at a number of centres all over India.

NOTES

- Candidates selected for Junior Research Fellowships may be asked to join at a place other than the one opted for, if necessary.
- Candidates who fail to appear at the admission tests will not be considered for admission. On the basis of the performance in the tests and past academic record, a limited number of candidates will be asked to appear at an interview for final selection subject to verification of their eligibility with reference to original documents.
- Any dispute concerning ADMISSIONS in 2015-2016 shall be settled in Kolkata subject to the jurisdiction of the Kolkata High Court.

IMPORTANT DATES

Online Application	Starts: February 03, 2015 Ends: March 03, 2015
Payment of Application Fee at SBI Branches	Starts: February 06, 2015 Ends: March 10, 2015
Issue of Admit Card/info booklet via post/portal	Starts: April 10, 2015
ISI ADMISSION TEST	May 10, 2015



Published by the Dean of Studies, Indian Statistical Institute