

PROSPECTUS



Goa University

**Master of Technology (M.Tech)
in
Computer Science**

Academic Year 2015-16

Department of Computer Science & Technology

Goa University, Taleigao Plateau, Goa – 403206

Website: www.unigoa.ac.in

Tel: 0832-6519325/272/087, Fax: 0832-2451184

Contents

	Page No.
Goa University	
A Brief Introduction	4
Hostel Accommodation	4
Department of Computer Science & Technology	
A Brief Introduction	4
Laboratory Facilities	4
Library Facilities	5
Teaching Faculty	5
Research Activity	6
M.Tech Programme Details	
Course Objective	7
Course Structure	7
List of Electives	8
Academic Calendar	10
Instructional Scheme	11
Scheme of Evaluation	11
Grading Scheme	12
Dissertation	13
Performance Indices	14
Award of Class	14
Ragging	14
M.Tech Admission Details	
Eligibility for Admission	15
Duration of the Course	15
Admission Procedure	15
Tie Breaking	15
Availability and Reservation of Seats	15
Important Dates for Admission during Academic Year 2014-2015	17
Fee Structure	17
Refund of Fees	17
Instructions for Filling in Application Form	17
APPENDIX A	
Syllabus for Entrance Test	18

Important Dates at a Glance for M.Tech Admissions

(Academic Year 2015 – 2016)

- On line Prospectus & Application form 9th June 2015
- Last date for online submission of completed application form 1st July 2015
- **Entrance Test**..... **4th July 2015**
(11 am – 12 noon)
- Display of merit list and waiting list 7th July 2015
- Last date for registration by merit list candidates..... 13th July 2015
- Complete First round of admissions to waiting list candidates. 17th July 2015
- Complete Second round of admissions to waiting list candidates 21st July 2015
- Final round of admission to waiting list candidates 28th July 2015
- Classes Commence..... 20th July 2015

Goa University

A Brief Introduction

Goa University was established in the year 1985 around the nucleus of the Post Graduate Centre and 17 Colleges affiliated to the Bombay University. Over the past decade, the University has grown steadily in size, and the scope of its academic programmes.

Presently the University has 12 Faculties encompassing a wide range of disciplines from Languages, Music and Art, Law, Natural Sciences, Life Sciences and Environment, Medicine, including Ayurveda, and Engineering, spread over 24 post graduate departments, 4 centres of studies, one UGC academic Staff College, 54 affiliated professional and general education colleges and institutions.

The University is located on a beautiful campus spreading over nearly 173 hectares on the Taleigao Plateau, overlooking the river Zuari joining the Arabian Sea. The Taleigao Plateau is located at a distance of 5 km from Panaji city, which is the capital of Goa. The various faculties of the University are housed in separate buildings, possessing considerable architectural distinction. The University Campus is serviced by numerous infrastructure facilities such as Hostels, Health centre, Post-office, Direct Inward Dialling, STD-ISD booths, Bank, Guest house, Kiosks and Canteens.

Hostel Accommodation

The University has full fledged hostels both for the men and women students. The hostels are located in close proximity to the Department and are well equipped with all modern facilities. There is a separate hostel for research students with limited accommodation. The students interested in seeking admission to the hostel are required to apply separately in the prescribed application form available from the respective Hostel Wardens.

Department of Computer Science and Technology (DCST)

A Brief Introduction

Anticipating the importance of Information Technology in present times, Goa University established the Department of Computer Science and Technology in the year 1987, with the financial assistance from DOE/UGC under the Manpower Development Scheme. A full time, 3- year degree programme leading to the “Master of Computer Applications” (MCA) degree was started in the academic year 1987-88. Goa University thus became one of the select universities of our country imparting training and education in the field of Computer Science and Application at the post graduate level.

From the academic year 2013-14, the Department has doubled student intake in its flagship MCA program and also offered two new research programs M.Phil (Computer Science) and M.Tech in Computer Science. Presently the department has seven permanent faculty members. Additional faculty members are likely to join the department in this academic year. The alumni of the Department are well placed and currently hold leading positions in reputed IT organizations in the country and abroad.

Laboratory Facilities

The Laboratory facilities in the Department are constantly upgraded to cater to the growing needs of students. Currently around eighty Intel desktops spread over the Department area – the laboratory as well as faculty offices – are served by Linux and Windows servers. About eighty students can simultaneously work on MS WINDOWS/linux/X-Windows platforms. Presently, the laboratory supports all computer languages, Integrated Development Environments and software tools available on Open Source Linux Platform. In addition to the usual Office suites, such as Microsoft Office, the laboratory also provides students and faculty with the latest versions of development tools and application platforms such as Oracle, Visual Studio, Rational suite, IBM RSA, MATLAB and Adobe eLearning suite. The Department subscribes to the Microsoft’s MSDN Academic Initiative which provides legal copies of all Microsoft software available on

workstation and Server platforms. Legal copies of Microsoft Software including operating systems and development tools are available for students for download under MSDN Academic Licence program.

The Department rides on a Campus-wide fibre-optic backbone and has high bandwidth connectivity to the Internet. The students of the department have 24 hour access to all Internet services and laboratory infrastructure.

Library Facilities

The Goa University Library started in June 1985 with a modest collection of 37678 books. Today the University Library is fully operational in a magnificent building of its own with holdings over 1,40,000 books and subscribes to over 458 technical journals and periodicals including over fifty online journals in the field of Computer Science and Application. It houses a collection of rare books and documents and has been recognized as one of the repositories for all publications of the United Nations. A searchable online catalogue of titles in the Library as well as Abstracts of Technical articles from over 100 journals is currently available on the Campus wide network. On the subject of Computer Science alone there are over 4,000 books, technical journals and magazines. Resources from digital library of prestigious societies like Kluwer, Elsevier & Springer Verleg are now available inside the campus under INFLIBNET scheme.

Teaching Faculty

Presently the department has seven full-time faculty members. As and when necessary the department invites resource persons from prestigious institutions and industry to conduct guest lectures on the specialized topics.

The list of faculty members along with their area of interest and contact details is listed below:

1. V. V. Kamat, M.Sc., M.Phil, Ph.D
Professor and Head
(Computer Graphics & CAD, Software Engineering, eLearning)
Email: vvkamat@unigoa.ac.in
Contact no: 0832- 6519072/6519087
2. Jyoti D. Pawar, B.Sc, M.C.A, Ph.D.
Associate Professor
(Data Structures, Data Mining, Natural Language Processing)
Email: jdp@unigoa.ac.in
Contact no: 0832- 6519325
3. Yma F. Pinto, B.Sc., M.C.A.
Associate Professor
(Data Base Management Systems, Operating Systems, Computer Science Education)
Email: yp@unigoa.ac.in
Contact no: 0832- 6519324
4. Ramrao Wagh, B.Sc, MCA.
Associate Professor
(Software Architecture, Object Oriented Technology)
Email: ramrao@unigoa.ac.in
Contact no: 0832 - 6519328
5. S. Baskar, M.Sc. (Comp. Sc.)
Associate Professor
(Artificial Intelligence, Energy Aware Computing & Embedded Systems)
Email: baskar@unigoa.ac.in
Contact no: 0832- 6519326

6. Ramdas Karmali, B.Sc., M.C.A.
Assistant Professor
(Computer Networking, Natural Language Processing)
Email: rnk@unigoa.ac.in
Contact no: 0832-6519327

7. Payaswini P., MSc(Computer Science)
Assistant Professor
Computer Networking
Email: ppayaswini@unigoa.ac.in
Contact No. : 0832-6519386.

Research Activity of the department

The department conducts Ph.D degree program in Computer Science. At present, students have registered for the Ph.D degree in the area of Data mining, Computer Aided Design (CAD) and Natural Language Processing (NLP). The department has been sanctioned three projects by the All India Council of Technical Education (AICTE) and three projects for the development of tools and resources for Natural Language Processing(NLP) in Konkani Language. These NLP Projects are funded by the Department of electronics and information technologY(DeitY), New Delhi. The Staff members of the department also guide the students for M.Phil, M.Sc(I.T) and B.E degree dissertation work.

The thrust areas of the department are Data Mining & Data Warehousing, Computer Graphics, Data Base Management System, Computer Networks, Software Engineering and Embedded System. The upcoming areas are Natural Language Processing and Computer Science Education.

M.Tech Programme Details

Course Objective

The program will prepare candidates with Bachelors Degree in Engineering or a Master's Degree in Science / Computer Applications for a research career either in industry or in academia.

Course Structure

M. Tech programme will consists of two years, four semesters. Semester-I and Semester-II will consist of two core and two elective papers and a seminar. Courses having lab requirement will have additional credits and it would be considered as integral part of the course. The candidate will choose electives based on the area of his/her research interests. During Semester-III and Semester-IV candidate will work on Dissertation Work.

First Semester					
Course code	Course Title	Lectures	Tutorial	Lab	Credits
MT 701	Combinatorics and Graph Theory	4	0	0	4
CS 702	Advanced Data Structures and Algorithms	4	0	2	6
EL-I	Elective – I	4	0	0	4
EL-II	Elective – II	4	0	0	4
	Credit Seminar I				2
	Total				20
Second Semester					
MT 703	Stochastic Modeling and Analysis	4	0	0	4
CS 704	Machine Learning	4	0	2	6
EL-III	Elective – III	4	0	0	4
EL-IV	Elective – IV	4	0	0	4
	Credit Seminar II				2
	Total				20
Third Semester					
	Research Progress Seminar - I				4
	Total				4
Fourth Semester					
	Research Progress Seminar - II				4
	Dissertation & Viva				12
	Total				16
	Grand Total				60

List of Elective Courses

- 600 - Computer Graphic & Animation
- 601- Advanced Computer Graphics
- 602 - Elements of Computational Geometry and Geometric Modeling
- 603 - Computer Vision
- 604 - Digital Image Processing
- 605 - Data Visualization
- 606 - Visual Computing
- 607 - Image Processing and Computer Vision
- 608 - Multimedia technologies
- 609 - Game Programming

- 611 - Natural Language Processing
- 612 - Computational Linguistics
- 613 - Speech Processing
- 614 - Sentiment analysis
- 615 - Machine Translation

- 620 - Introduction to Game Design and Simulation (2 credits)
- 621 - Instructional Design for e-Learning
- 622- Educational Technology
- 623 - Educational Game Design
- 624 - Video Games and Learning
- 625 - Gamification

- 631- Distributed Databases
- 632 - Design Of Distributed Systems
- 633 - Systems Performance Evaluation
- 634 - Cloud And Utility Computing
- 635 - Data Analytics
- 636 - Information Retrieval
- 637 - Data Warehousing and Data Mining

- 640 - Programming Paradigms
- 641 - Programming using Python (2 credits)
- 642 - Parallel Programming
- 643 - Java Programming
- 644 - Learning Computer Programming by Building Android Apps (2 credits)

- 650 - Human Computer Interaction
- 651 - Agile Software Engineering
- 652 - Software Architecture, Design Patterns and Frameworks
- 653 - Software Project Management
- 654 - Software Testing
- 655 - Middleware Technology
- 656 - Component Technology

- 660 - Advanced Computer Architecture
- 661 - Advanced Operating Systems
- 662 - Network Programming
- 663 - Advanced Unix Programming
- 664 - Biomechanics (2 credits)
- 665 - Internet Technologies
- 666 - Physical Computing (2 credits)

- 681 - Managerial Economics
- 682 - Corporate Planning
- 683 - Investment Technology
- 684 - Business Finance

685 - Management Information Systems
687 - Organizational Behaviour
688 - System Analysis and Simulation
689 - Foundation of Decision Processes
690 - Taxation Practices
691 - Accounting and Financial Management
692 - Management Fundamentals & Information System
693 - Electronic Commerce

Academic Calendar

The academic year shall consist of two semesters referred to as odd and even semesters. The semesters start every year in the beginning of the month of July and January and each semester is of about 16 weeks duration. Students are required to attend at least 75% of the classes held in each course/subject and actively participate in study-seminars, tutorials and laboratory work prescribed from time to time to the satisfaction of the Department. The schedule for the academic year 2015-2016 is as follows:

Semester I

Classes Commence	20 th July 2015
Ganesh Chaturthi Break..	21 st Sept to 23 rd Sept 2015
Diwali Break.....	11 th Nov to 13 th Nov 2015
Teaching Ends.....	30 th Nov 2015
End – Semester Examinations.....	1 st Dec to 7 th Dec 2015

Semester II

Classes Commence	4 th Jan 2016
Teaching Ends	13 th May 2016
End – Semester Examinations.....	17 th May to 21 st May 2016
Summer Vacation	22 nd May to 5 th June 2016

Note: The students of second year (III and IV Semester) will carry out the dissertation work from June 2015 to May 2016

Instructional Scheme

Course: Master of Technology (M.Tech) Degree program is based on a system of integrated units called courses. Each course shall mean one paper.

Course Credit: One credit shall be evaluated for 25 marks. Four credit courses shall be of 100 marks. One credit is equivalent to one contact hour per week. The dissertation shall carry 16 credits.

Cumulative Credits: The sum total of all the credits of all the courses taken in a semester.

Contact Hours: A 4 credit course shall have a minimum of 45 contact hours, with 4 contact hours per week, which shall comprise of Lecture hours, Tutorial hours and Laboratory hours.

Instructor-in-Charge: Each course may have one or more instructors teaching the course. One of these is to be appointed as Instructor-in-charge.

Course Coordinator: In case of courses taught by Visiting Faculty, one faculty member from the department shall be associated with the course as Course Coordinator

Course File: For each course taught, a file shall be maintained by the Instructor-in-charge comprising of course plan, reading/teaching material used in class, assignments, question papers, answer papers, student feedback, student attendance record along with final evaluation and grading.

Academic Audit Committee: The task of the academic audit is to ascertain that all in-semester and end-semester evaluation is done in transparent and fair manner. The committee shall comprise of two members appointed by the Vice-Chancellor, one from the University Department and one expert from Industry/ Academia. It shall meet once every year end and shall examine the course file. On the basis of aberrations noticed if any, Academic Audit Committee shall take appropriate action to resolve the matter.

Scheme of Evaluation

There shall be both an in-semester element and an end-semester element in the evaluation of the performance of candidates. The in-semester evaluations shall be 60% and end-semester evaluation shall be of 40%

In in-semester evaluation, at least 40% evaluation shall be graded through one or more class tests. The remaining could be evaluated through quizzes, assignments etc.

The end-semester evaluation shall consist of an 'end-semester' examination of 40% evaluation conducted by the department. A candidate is eligible to appear for the end-semester examination if she/he has a minimum of 75% attendance.

For a course with lab component, the assessment will be continuous and in-semester evaluation consisting of lab experiments, assignments etc. as decided by the Instructor-in-Charge

Final grades for the course would be awarded by the Instructor-in-charge/course co-ordinator taking into account the total performance.

There shall be no revaluation. The students can make an appeal to the Chairman Departmental Council in case of any discrepancies in evaluation. The Chairman shall refer the matter to the Academic Audit Committee. The Academic Audit Committee shall also function as the Grievance Redressal Committee for the Programme.

Grading Scheme

For each course taken by a candidate, a letter grade is assigned based on the performance in all assessments. These grades are defined as:

AA, AB, BB, BC, CC, CD, DD, EE, II and FF

Each grade not only indicates a qualitative assessment of the student's performance but also carries an equivalent number called the grade point.

The grade points corresponding to different letter grades are defined below:

Letter Grade	Grade point	Letter Grade	Grade point
AA	10	CD	5
AB	9	DD	4
BB	8	EE	0
BC	7	II	0
CC	6	FF	0

A candidate passes the courses if he/she gets any grades in the range AA to DD.

The letter grade EE and the letter grade II makes the candidate eligible to take a supplementary examination in that course.

The letter grade II is given to a candidate on account of absence from the end-semester examination for valid reason.

The letter grade EE is given to a candidate on account of poor performance in the end semester examination.

The letter grade EE and II are not awarded in supplementary examination

Supplementary Examination shall be held at the beginning of every semester.

A candidate who fails in the supplementary examination is awarded FF grade and has to repeat the entire course. The candidate who fails to appear for the supplementary examination or remains absent is awarded FF and has to repeat the entire course

Candidate who fails in the Seminar or Dissertation may be allowed to re-submit the seminar report/ dissertation after incorporating suitable modifications under the guidance of the teacher.

A student shall be considered to have passed a course at first attempt, provided he/she passes with a letter grade of DD or better, at the regular examination.

In addition to the above, a student getting a letter grade of II at the regular examination and subsequently passing the course at the supplementary examination with letter grade of DD or better, will be considered to have passed the course at first attempt. However a candidate getting a letter grade of EE at the regular examination shall be deemed to get letter grade DD in the supplementary examination, if successful.

All other cases would be treated as second attempts.

Dissertation

The candidate shall be evaluated for research carried out in the 3rd & 4th semester. The evaluation shall consist of two Research Progress Seminars, Dissertation and Viva.

The Departmental Council shall decide at the beginning of the academic year the modalities relating to the dissertations. Topics for dissertations shall be finalized before the end of the first/second semester. The Departmental Council shall decide the number of candidates that a teacher can guide for the dissertation. Once the candidate decides on the topic of research, he/she shall apply in the prescribed form to the Head of the Department through the proposed guide and co-guide, as the case may be, under whose supervision he/she proposes to do research. A write-up of up to 1000 words incorporating the following points shall be enclosed with the application:

- a) Title of proposed research.
- b) Historical background and its present relevance
- c) Research-aims and objectives

For each candidate working on the dissertation topic, a Dissertation Research Committee (DRC) shall be constituted to assess the progress of the candidate. The committee shall evaluate the progress of the candidate through Research Progress Seminar(s) for not less than 30 minutes.

The composition of the DRC will be as follows:

GuideConvener
Co-guide, if applicable Member
Two Subject Experts..... Member

The Subject Experts shall be nominated by the Departmental Council in consultation with the research guide. Only on obtaining pass grade in both the Research Progress Seminars, the candidate shall be allowed to write the dissertation.

At the time of submission of dissertation, the candidate shall declare, in the prescribed proforma, that the dissertation is his own work and that all the sources used by him/her are duly acknowledged.

The guiding teacher shall certify, in the prescribed proforma, that the dissertation is an original work of the candidate completed under his/her supervision.

Candidate shall submit the dissertations to the Head of the Department through the guiding teacher at the end of the fourth semester. However, he/she shall be permitted to submit the dissertation any time thereafter, upto a maximum period of four years from the initial registration.

Every candidate shall submit three copies of the dissertation to the Department in the prescribed format as under:

The size of paper: A4 (approximately 29 cm x 21 cms) except for drawings, graphs and maps, on which no restriction is placed. A margin of 2.5 cm. is to be kept on the left hand side. The front cover of the dissertation, bound in a standardized form, should contain the title of the dissertation, degree, date and name of the student concerned. The dissertation should be neatly typed in double space and only on one side of the paper.

The dissertation shall be evaluated as follows:

The dissertation shall be assessed by an external examiner to be appointed from the panel of examiners approved according to the University Ordinance OB-4.

On acceptance of the dissertation by the external examiner, a viva shall be jointly conducted by guide/supervisor and the external examiner. The presentation by the candidate shall be made before the Departmental Council members and the students for not less than 30 minutes.

A candidate who fails in the dissertation may be allowed to re-submit the dissertation after incorporating suitable modifications recommended by the examiner, under the guidance of the teacher.

Performance Indices

Semester Performance Index (SPI):

The performance of a student in a semester is indicated by a number called SPI. The SPI is the weighted average of the grade points obtained in all the courses during the semester. For example, with courses in a semester, having credits C1, C2, C3, C4 and C5 and the grade points in the semester being g1, g2, g3, g4 and g5 respectively then the SPI is equal to:

$$\text{SPI} = \frac{\sum_{i=1}^5 C_i g_i}{\sum_{i=1}^5 C_i}$$

The SPI is calculated to two decimal places

Cumulative Performance Index (CPI)

The overall performance of a student for the entire programme is obtained by calculating a number called CPI. The CPI is the weighted average of the grade points obtained in all the courses for the programme. The CPI is also calculated to two decimal places.

Award of class

The class for M.Tech degree programme will be awarded according to following scheme

CPI	Class
≥ 8.50	First Class with Distinction
$6.50 \leq x < 8.50$	First Class
$5.00 \leq x < 6.50$	Second Class
$4.00 \leq x < 5.00$	Pass Class

There is no provision for gracing in the individual paper.

Percentage equivalent of CPI is approximately given by the formula

$$\text{Percentage} = 10 * \text{CPI} - 5.0$$

Any item not covered by the programme specific Ordinances shall be governed by the University rules/regulations/ordinances in force.

Ragging

Ragging is considered a definite menace by society. Accordingly, the UGC has instructed that ragging in all forms be strictly banned by the institutions and to ensure that the campus environment be made free from ragging. All the students are strictly instructed not to indulge in ragging of any form. Strict disciplinary action will be taken against any student found guilty of ragging. The residents of the Goa University hostels are required to take special note of the above.

Further, under the Goa Prohibition of Ragging Bill 2007 strict, disciplinary action will be taken against those convicted for ragging directly or indirectly, so also those who commit, participate in abet or propagate ragging within or outside any educational institution, which may include removal from the roll of the institution for three years. Any student removed for such offense shall not be admitted in any other educational institution in the state.

Students indulging in ragging shall also be debarred from claiming scholarships or other benefits, representing in events, examinations. In case individuals committing or abetting ragging are not identified, collective punishment shall be imposed against those involved.

The Head of the Department will obtain an annual undertaking from every student stating that they have read the relevant instructions / regulations against ragging as well as punishments detailed therein.

M.Tech Admission Details

Eligibility for Admission

1. B. E. / B. Tech. in Computer Science / Information Technology / Electronics / Electronics and Telecommunication or equivalent with 55% aggregate marks or equivalent CGPA 6.0 (50% or equivalent CGPA 5.5 for reserved category) from recognized University

OR

2. MCA/MSc(IT) or equivalent with 55% marks or equivalent CGPA 6.0 (50% or equivalent CGPA 5.5 for reserved category) from the faculty of Technology/ Engineering/ Science of the recognized University.

The degrees listed at 1 and 2 are referred henceforth as the Eligibility Qualifying Examination in this prospectus.

In addition, all candidates will have to undergo an Entrance Test conducted by the department in which he/she is applying. The syllabus prescribed by the University for the Entrance Test is placed at APPENDIX A.

Note: Those having a valid GATE/NET score in the subject of Computer Science/Engineering shall be exempted from the Entrance Test.

Candidates who have appeared for a degree examination and are awaiting results are also eligible to apply. In case such candidates are selected and their results are not available at the time of admission, these candidates will be given provisional admission.

Students are admitted to the programme once a year.

Duration of the Course

Minimum four semesters spread over two academic years. Maximum time allowed for a candidate to complete M.Tech programme shall be four years.

Admission Procedure

1. After the last date of receiving the applications, two separate merit lists shall be prepared of candidates having a valid GATE and NET score showing category-wise(OBC/SC/ST/etc) details. The total number of candidates admitted from each list (GATE and NET) will be proportionate to the total number of candidates in each list.
2. During the process of admission, any seat falling vacant in any reserved category shall be filled in as per the existing University rules.
3. If there are applications without valid GATE/NET score, the Department shall conduct a separate Entrance Test for such candidates based on the syllabus prescribed for GATE in the subject of Computer Science and Information Technology. (Copy of the syllabus is available in Appendix-A). The entrance test shall be of one hour duration with 25 Multiple Choice Questions (MCQ) with negative marking. A separate merit list shall be prepared for such candidates and operated only when there are vacant seats that cannot be filled with valid GATE/NET qualified candidates.
4. Same procedure listed above from 1 to 3 will be applied to fill the seat for the candidates from other Universities.

At the most there shall be three rounds of admission and any seat falling vacant after the third round of admission shall not be filled.

Tie Breaking

In case there is a tie for a seat between candidate having valid GATE/NET score, preference will be given to NET qualified candidates with JRF/Lectureship.

In the case of candidates having equal score in the GATE/NET/Entrance Test, the candidate securing higher percentage of marks in the Eligibility Qualifying Examination will be given priority.

In case the results of the Eligibility Qualifying Examination are not available, the percentage obtained at XII standard will be used for breaking the tie.

Availability and Reservation of Seats

The total number of seats for the M.Tech degree Course is twelve. University shall allocate these seats as per the State Government/University policy in force from time to time.

Accordingly, the distribution of seats for academic year 2015-16 will be as follows -

Sr.No	Category	Seats
1	OBC(27%)	3
2	SC(2%)	1
3	ST(12%)	1
4	PH(3%)	1
5	General	5
6	Other Universities	1
	Total Seats	12

Note: OBC, SC, ST, PH and General applicable only for local candidates.

Important Dates for M.Tech Admissions of the Academic Year 2015 – 2016

- On line Prospectus & Application form 9th June 2015
- Last date for online submission of completed application form 1st July 2015
- **Entrance Test**..... **4th July 2015**
(11 am – 12 noon)
- Display of merit list and waiting list 7th July 2015
- Last date for registration by merit list candidates..... 13th July 2015
- Complete First round of admissions to waiting list candidates. 17th July 2015
- Complete Second round of admissions to waiting list candidates 21st July 2015
- Final round of admission to waiting list candidates 28th July 2015
- Classes Commence..... 20th July 2015

For any details contact -

Admission Coordinator (M.Tech) 2015 - 2016
Department of Computer Science & Technology,
Goa University, Taleigao Plateau,
Goa 403 206.
E-mail: dcst@unigoa.ac.in ; yp@unigoa.ac.in
Ph: 6519272

Fee structure

For the academic year 2015-16, total fees prescribed for the candidates graduating from Goa University is Rs. 35,780/- per year and for candidates from other universities is Rs. 37,580/- per year.

For students requiring hostel accommodation, the University has full fledged hostels both for the men and women students. For details referring to Hostel charges refer to the Goa University Handbook for academic year 2015-16.

Refund of Fees

1. In the event of a student withdrawing admission before the commencement of the course, the waitlisted candidate will be granted admission against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (one thousand only) shall be refunded by the Institution/University to the student withdrawing from the programme.
2. If the student leaves after joining the course and if the seat consequently falling vacant has been filled by another candidate by the last date of admission, the Institution shall return the fee collected with proportionate deductions of monthly fee and proportionate hostel rent, where applicable.
3. No refund of fee is admissible if the student withdraws admission on the last date or later. Above rule is applicable to all items of fee except refundable deposits.
4. Students who have already been admitted to a Department/Centre of the University and have paid the fee and are subsequently admitted to another Department/Centre on or before the last date of admission will have to pay the fee for the final admission and claim refund of fee paid earlier.

All other cases of refund of fees will be decided on a case to case basis, based on its merits.

Instructions for Filling in Application Form:

The applications for the M.Tech programme can be submitted online in the prescribed Application Form ONLY.

The instructions for filling online application form are available under the link [M.Tech Admissions \(2015-16\)](#) on the Goa University website www.unigoa.ac.in

APPENDIX A
Syllabus for Computer Science and Information Technology (CS)

ENGINEERING MATHEMATICS

Mathematical Logic: Propositional Logic; First Order Logic.

Probability: Conditional Probability; Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; uniform, normal, exponential, Poisson, Binomial.

Set Theory & Algebra: Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

Combinatorics: Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotics.

Graph Theory: Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

Linear Algebra: Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors.

Numerical Methods: LU decomposition for systems of linear equations; numerical solutions of non-linear algebraic equations by Secant, Bisection and Newton-Raphson Methods; Numerical integration by trapezoidal and Simpson's rules.

Calculus: Limit, Continuity & differentiability, Mean value Theorems, Theorems of integral calculus, evaluation of definite & improper integrals, Partial derivatives, Total derivatives, maxima & minima.

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point).

Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes – P, NP, NP-hard, NP-complete.

Theory of Computation: Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undecidability.

Compiler Design: Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

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

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

Information Systems and Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

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

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