THE GUJARAT CANCER & RESEARCH INSTITUTE

Announces

M.Sc. in Cancer Biology

Starting from July 2013
(First Time In India)
Two Years Full Time Course Run by Cancer Biology Department

Affiliated to Gujarat University
Knowledge is retained by constant practice
MESSAGE

It is a well-known fact, that 21st century is the century of knowledge. The technological upgradations and innovations have extended our reach in availing the comforts and combating the diseases. For synchronizing with the pace of advancements in every sphere of life in this era, need for the expertise and specialty is growing more and more in every area inducing the medical science. The M.Sc. in Cancer Biology will be an effective move to cater to the demand of well trained persons to combat the battle with this deadly disease. The research work going on for cancer will get the boost by this initiative. The co-ordination of the research work and practical therapies being the part of this course, will help in developing the high skilled professionals. I extend my congratulations to The Gujarat Cancer Research Institute for starting new course, M.Sc. in Cancer Biology and my best wishes for all the success.

To,
Dr. Shilin N. Shukla,
Hon. Director,
The Gujarat Cancer & Research Institute,
Civil Hospital Campus, Asarwa,
Ahmedabad-380016.
e-mail : geriad1@bsnl.in

Narendra Modi
Chief Minister, Gujarat State
The Gujarat Cancer & Research Institute (GCRI) jointly managed by the Government of Gujarat and Gujarat Cancer Society (GCS) has been leading the way in the war against cancer for nearly four decades. With nearly 25,000 new cancer cases diagnosed each year, integrating medical care and clinical research with academic learning and education is an important step forward in sharing knowledge and delving deeper for newer solutions.

As we continue to fight cancer, we will need young professionals who have received frontline training, knowledge and practical experience that is best gained from the hospital environment. This provides the best means of understanding the disease in its entire spectrum. At GCRI, the students will gain insights in the field of Cancer Biology from experts who are rooted in this field, where a dedicated team is looking at new understandings and newer pathways to treat cancer. As a regional cancer centre, the wealth of learning that GCRI can offer for understanding cancer biology is vast and expansive and this is what makes the new post graduate course offered by GCRI in this sphere, an extremely relevant one.

The course which aims to provide specific orientation on cancer, practical academic insights in the field of cancer biology and includes a research project under the guidance of cancer research scientists, combines all aspects of theoretical knowledge, practical understanding, specialization and research.

As we uncover the underlying mechanisms for treating cancer and develop new knowledge techniques and interventions for patient care, the inter-relationships between academics, medical care and research will greatly reinforce our fight against cancer.

I am sure this pioneering initiative of GCRI will lead to new learning and new beginnings.

SHRI PANKAJ R. PATEL
It is my great pleasure to introduce the new course, M.Sc. Cancer Biology (Life Science), for the first time in India, at The Gujarat Cancer & Research Institute (GCRI) in affiliation with Gujarat University, Ahmedabad. Cancer Biology is identified as a thrust area for education and research by GCRI, Government of India as well as various other organizations, worldwide. This unique post graduate programme immerses students in a broad multidisciplinary curriculum that includes opportunities for original and critical thinking and extensive interactions with outstanding basic and clinical scientists at one of our nation's most dynamic cancer-focused Institute. Our goal in the Cancer Biology Post Graduate Programme is to instill love and commitment for scientific discovery as we train the next generation of researchers in cancer biology. The programme and institution offers state-of-the-art research facilities, accomplished faculty, combined with outstanding prospects in academic and research Institutes.

I wish all the success for the course.
DIRECTOR OF THE COURSE

Dr. Shilin N. Shukla
Hon. Director, The Gujarat Cancer & Research Institute & Professor of Medical Oncology

COURSE CO-ORDINATORS

Dr. Prabhudas S. Patel  
Head, Biochemistry Research Division  
and Head, Cell Biology Division

Dr. Hemangini H. Vora  
Head, Immunohistochemistry  
and Flow Cytometry Division

FACULTY MEMBERS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Year of Ph.D Completion</th>
<th>Post Ph.D Research Experience</th>
<th>Year of Joining the Institute</th>
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<tbody>
<tr>
<td>1.</td>
<td>Dr. Prabhudas S. Patel</td>
<td>1992</td>
<td>20 years</td>
<td>November, 1981</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Neelam G. Shah</td>
<td>1992</td>
<td>20 years</td>
<td>April, 1982</td>
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<td>3.</td>
<td>Dr. Hemangini H. Vora</td>
<td>1995</td>
<td>17 years</td>
<td>May, 1984</td>
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<td>4.</td>
<td>Dr. Nandita G. Ghosh</td>
<td>1995</td>
<td>17 years</td>
<td>December, 1985</td>
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<tr>
<td>5.</td>
<td>Dr. Rakesh M. Rawal</td>
<td>1999</td>
<td>13 years</td>
<td>April, 1991</td>
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<tr>
<td>6.</td>
<td>Dr. Trupti I. Trivedi</td>
<td>2007</td>
<td>5 years</td>
<td>March, 1994</td>
</tr>
<tr>
<td>7.</td>
<td>Dr. Jayendra B. Patel</td>
<td>2006</td>
<td>6 years</td>
<td>August, 1996</td>
</tr>
<tr>
<td>8.</td>
<td>Dr. Franky D. Shah</td>
<td>2006</td>
<td>6 years</td>
<td>August, 1996</td>
</tr>
<tr>
<td>9.</td>
<td>Dr. Nilima S. Desai</td>
<td>2010</td>
<td>2 years</td>
<td>April, 1992</td>
</tr>
<tr>
<td>10.</td>
<td>Dr. Manisha M. Brahmbhatt</td>
<td>2011</td>
<td>1 year</td>
<td>October, 1999</td>
</tr>
<tr>
<td>11.</td>
<td>Dr. Pina J. Trivedi</td>
<td>2012</td>
<td>1 year</td>
<td>August, 1997</td>
</tr>
</tbody>
</table>

ADVISORY COMMITTEE

Dr. Baldev V. Patel  
Dean, Science Faculty,  
Gujarat University,  
Ahmedabad, Gujarat, India

Dr. G. Naresh Kumar  
Professor & Head,  
Biochemistry Department,  
MS University,  
Baroda, Gujarat, India

Dr. Neeta Singh  
Professor and Head,  
Biochemistry,  
All India Institute of Medical Sciences,  
New Delhi, India

Dr. S. Manoharan  
Associate Professor,  
Biochemistry & Biotechnology,  
Annamalai University,  
Tamil Nadu, India

Dr. Nayan K. Jain  
Professor and Head,  
Life Sciences Department,  
Gujarat University,  
Ahmedabad, Gujarat, India

Dr. Harish Padh  
Vice Chancellor,  
Sardar Patel University,  
 Vallabh Vidyanagar,  
Gujarat, India

Dr. Bhart Vyas  
Deputy Director and Professor of Radiotherapy, The Gujarat Cancer & Research Institute

Dr. Neeta Singh  
Professor and Head,  
Biochemistry,  
All India Institute of Medical Sciences,  
New Delhi, India

Dr. Bharat Shah  
Dean, BJ Medical College,  
Ahmedabad, Gujarat, India

Dr. Raj K. Puri  
Director, The Division of Cellular and Gene Therapies,  
Food and Drug Administration,  
Bethesda, MD 20892, USA

Dr. Girish Parmar  
Dean, Government Dental College and Hospital,  
Ahmedabad, Gujarat, India

Dr. Rakesh Vyas  
Deputy Director and Professor of Radiotherapy, The Gujarat Cancer & Research Institute

Dr. Professor Sarat Dalai  
Dean, Faculty of Science,  
Nirma University,  
Ahmedabad, Gujarat, India

Dr. Rakesh K. Jain  
Director, Edwin L. Steele Laboratory for Tumor Biology,  
Massachusetts General Hospital, Boston, USA

Dr. M. Radhakrishna Pillai  
Director, Rajiv Gandhi Centre for Biotechnology,  
Thiruvananthapuram, Kerala, India

Dr. Geeta Joshi  
Deputy Director and Professor of Anesthesia, The Gujarat Cancer & Research Institute
The Gujarat Cancer & Research Institute (GCRI) is a regional cancer centre of Government of India, established in 1972 from M.P. Shah Cancer Hospital founded in 1964. Today, GCRI is 650 bedded comprehensive cancer centre with world class cancer care facility and a competent team of clinicians and scientists to take pride of. The Institute is affiliated to the BJ Medical College and Gujarat University, Ahmedabad, for superspecialty teaching in the subjects of Medical and Surgical Oncology (DM and MCh courses) as well as postgraduate teaching in subjects like Pathology, Radiodiagnosis, Gynaecological Oncology, Anaesthesiology and Radiotherapy (MD, DCP, DMRE, DA courses). It is also affiliated to Gujarat University (Life Sciences and Medical Microbiology) and M.S. University (Biochemistry) for PhD degree courses. It has international collaborations with Germany, France, USA and UK for clinical translational research and education, and is a nodal centre of Gujarat State for Bioinformatics.

The word “Research” interwoven in the name of the Institute (GCRI) since its inception indicates the eminence of Research and Education in the foundation of the Institute. The Cancer Biology Department (Research Wing) was established in 1980 with three research laboratories. Today, it has grown up to five well equipped world class research laboratories, each having an enthusiastic team working on various cancer research projects.

The Cancer Biology Department represents a unique example of education and research which are integrated with state-of-the-art research activities. The Department is actively engaged in cancer research particularly in the field of molecular epidemiology, cytogenetics, genomics, proteomics, epigenomics, stem cell research, bioinformatics, medicinal chemistry and
pharmacogenomics. The laboratory techniques employed for these studies are conventional cytogenetics, FISH, Multi-colour FISH, PCR, Real Time PCR, RFLP, 2D gel electrophoresis, ELISA, immunohistochemistry, flow cytometry, immunochemiluminescence enzyme assay, cell culture, bioinformatics, etc. The Department has earned national and international fame through its more than 300 research projects (on-going and completed and funded in house by The Gujarat Cancer Society as well as state, national and international funding agencies), more than 400 research papers published in peer reviewed national and international journals and honors/ awards achieved at national and international forums.

Apart from research, the Department is also involved in educational activities which include dissertations to post graduate students of M.Sc., M.Pharm. and M.Phil. (both within and outside Gujarat), observership to postgraduate students from science and allied science and permitting Ph.D. students of many universities to perform their partial Ph.D. work at Cancer Biology Department.

Besides, institutional research and educational activities, the Department's faculty members are visiting faculties and examiners of various M.Sc., M. Pharm, M. Phil and Ph.D. courses of Gujarat University and many other universities of India. They are Reviewers of peer reviewed national and international journals. Till date, the Department has generated 35 Ph.D. students all having leading positions at GCRI, other research organizations, industries and academics in India as well as abroad. Currently, 21 students are catering their Ph.D. studies. Over 250 students have carried out their post graduate dissertations from the Department. Similarly, every year, more than 200 under graduates and post graduate students undergone short- and mid- size training programme.

Now, one more feather is added in the cap of GCRI. The Institute will offer M.Sc. in Cancer Biology course in affiliation with Gujarat
University, for the first time in India. The Cancer Biology Department will run this course. This Cancer Biology course is designed for students who wish to acquire advanced education and training in biological sciences, pertaining to a disease that affects a large proportion of the global population. The course provides training in the modern practical, academic and research skills that are used in academia and industry. The programme will culminate with a research project that investigates the molecular and cellular basis of cancer biology under the supervision of active cancer research scientists. Through a combination of lectures, small-group seminars and practical classes, students will apply the knowledge gained towards translational research and development of new therapies. It will open avenues in Academics, and Research Institutes, Pharmaceutical Industries and Diagnostic Laboratories catering technology development, stem cell research, translational research, etc, and as Post-doctoral students in India and abroad to further advance their knowledge in the subject.
World Class Laboratory Set-up

- Cytogenetics
- ELISA Reader
- Liquid Nitrogen Storage
- Immunoanalyser
- Gel Documentation
- Automated Karyotyping
- Real Time PCR
- BOD Incubator
Apart from the five well equipped laboratories, the Department has all basic amenities required for teaching including seminar hall, classroom, library and audio visual teaching aids useful in effective teaching. The library has more than 2810 books, 68 national and international journals, internet facilities and access to proquest medicine. The Department is well equipped with Real-Time PCR Machine, Thermal cyclers, UV-Vis Spectrophotometers (Single beam and Double beam), Gel Documentation Systems, electrophoresis Unit (Vertical and Horizontal) with Blotting Unit and 2D electrophoresis set up, HPLC, Imaging System for karyotyping, FISH set up, Roche Cobas e411 Immunoanalysyer, ELISA Plate Reader, Flow Cytometer, Ventana Benchmark Auto Immunostainer for immunohistochemistry, Beta Counter, Ultracentrifuge, Deep Freezers (-20°C and -80°C), Biosafety Cabinets, Cell Culture facility, Phase Contrast Microscopes, CO2 Incubator, etc.

**INFRASTRUCTURE AND FACILITIES**

Graduates in one of the disciplines of Biological Sciences including Biochemistry, Microbiology, Biotechnology and Zoology of Gujarat University or any other University recognized as equivalent.

**ELIGIBILITY FOR M.Sc. IN CANCER BIOLOGY**

Every year, announcement of the course will appear in Gujarati and English news papers as well as on the website of GCRI (www.cancerindia.org). Admission will given based on the merit list with weightage of personal interview as well as marks in graduation degree.

**ADMISSION CRITERIA FOR M.Sc. IN CANCER BIOLOGY**

Every year, 15 students will be admitted. Reservation of seats for candidates belonging to SC/ST/SEBC/PH etc. in both the categories will be as per rules of Gujarat University.

**INTAKE CAPACITY FOR M.Sc. IN CANCER BIOLOGY**

Fee structure is as follows:

For **Boys: Rs. 13500/-** and for **Girls Rs.12000/-** per semester, per student. An examination fee of **Rs. 500/-** per semester is collected along with the examination form. The convocation fee is charged as per Gujarat University rules.

Fees once paid shall not be refunded under any circumstances.
COURSE STRUCTURE FOR M.Sc. IN CANCER BIOLOGY

The medium of teaching is English. The two year post graduate course consists of four semesters. In each of the first three semesters, there are four theory papers of 100 marks, each. A total of 47 practicals will be conducted in first three semesters. The total marks in first, second and third semester, each, including theory and practicals is 600 marks. Internal assessment is based on internal examination evaluation, experiment, viva voce, attendance, seminar, quiz, assignments, industrial/research centre visit, etc. The fourth semester is devoted to dissertation/project work, seminars, assignments, industrial/ research centre visit, etc. and carries 600 marks. Grand total of marks is 2400.

The emphasis of teaching will pertain to the major aspects of cancer i.e. cellular and molecular basis of cancer, epidemiology, etiology, genomics, proteomics, cytogenetics, tumor immunology, stem cell and regenerative medicine. Apart from teaching the fundamentals of Cancer Biology, Bioinformatics and Biostatistics, special emphasis will remain to nurture the students in the field of oncology, clinical research, cancer research, and pharmaceutical drug discovery. The practicals conducted by the Department will take care of basic and advanced techniques pertaining to the Cancer Biology course.

SCHEME OF EXAMINATION

Semester examination will be held in the month of December and May, every year as per Gujarat University schedule. The following shall be the scheme of examination.

EVALUATION

The distribution of marks for theory papers will be as follows:

External marks for all the papers is awarded based on examination conducted by the University at the end of each semester, and the internal marks is based on evaluation by faculties. ATKT system will be followed as per the Gujarat University rules.
# SYLLABUS

## First Semester

<table>
<thead>
<tr>
<th>Theory Papers</th>
<th>Course</th>
<th>External Marks</th>
<th>Internal Marks</th>
</tr>
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<tbody>
<tr>
<td>CB - 401  Fundamentals of Cell and Cancer Cell Biology</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 402  Cytogenetics-I</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 403  Cellular and Molecular Basis of Cancer - I</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 404  Cancer Epidemiology and Etiology</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 405PR Practical – I</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 406PR Practical – II</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>420</strong></td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>

Literature Survey for Dissertation Topic

## Second Semester

<table>
<thead>
<tr>
<th>Theory Papers</th>
<th>Course</th>
<th>External Marks</th>
<th>Internal Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB - 407  Cytogenetics-II</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 408  Cellular and Molecular Basis of Cancer - II</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 409  Stem Cell and Regenerative Medicine</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 410  Basic Immunology</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 411PR Practical – I</td>
<td>4</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>CB - 412PR Practical – II</td>
<td>4</td>
<td>70</td>
<td>30</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>420</strong></td>
<td><strong>180</strong></td>
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Selection of Dissertation Topic and Review Work

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National Science Day Celebrations
## SYLLABUS

### Third Semester

<table>
<thead>
<tr>
<th>Theory Papers</th>
<th>Course Credits</th>
<th>External Marks</th>
<th>Internal Marks</th>
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<tbody>
<tr>
<td>CB - 501 Cancer Genomics and Proteomics</td>
<td>4</td>
<td>70</td>
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<tr>
<td>CB - 502 Tumor Immunology</td>
<td>4</td>
<td>70</td>
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<tr>
<td>CB - 503 Cancer Drug Discovery and its Application in Cancer Research</td>
<td>4</td>
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<tr>
<td>CB - 504 Biostatistics and Its Application in Cancer Research</td>
<td>4</td>
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<tr>
<td>CB - 505PR Practical – I</td>
<td>4</td>
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<tr>
<td>CB - 506PR Practical – II</td>
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<td><strong>Total</strong></td>
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<td><strong>180</strong></td>
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Method Standardization for Dissertation and Preliminary Work

### Fourth Semester

<table>
<thead>
<tr>
<th>Theory Papers</th>
<th>Course Credits</th>
<th>Marks</th>
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<tbody>
<tr>
<td>CB - 507S Seminars / In House Training</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>CB - 508A Assignments / Group Discussions</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>CB - 509PT Dissertation and Viva</td>
<td>16</td>
<td>400</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>600</strong></td>
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Please visit our website ([www.cancerindia.org](http://www.cancerindia.org)) for detailed syllabus and profile of the Institute.
The Gujarat Cancer & Research Institute
The Gujarat Cancer Society

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Course E-mail: cancerbiologygcrci@gmail.com