A Short Term Course
On
METAGENOMICS & MICROBIOMES
Under
MHRD Scheme on Global Initiatives of Academic Networks (GIAN)

February 20 to 25, 2017

UGC-CAS  Department of Biosciences
Saurashtra University, Rajkot-360005
Gujarat - India
Global Initiatives of Academic Networks

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About Saurashtra University

Saurashtra University, established on 23rd May, 1967, is situated in Rajkot city of the Saurashtra region of Gujarat State. The lush green campus of the University is spread over 360 acres of land. The jurisdiction of the University includes Rajkot, Amreli, Jamnagar, Morbi and Surendranagar districts.

It has 29 Post graduate Departments on its campus and 228 affiliated colleges.

Vision

The vision of Saurashtra University is to be at the vanguard of knowledge in the domain of higher learning and achieve the highest global standards.

Mission

- To achieve excellence in teaching and research
- To empower learners in achieving their professional goals
- To strengthen educational-professional interface
- To contribute in building the society and the nation
- To improve the quality of life in harmony with our heritage culture and environment
- To relate learning with the highest human values
UGC-CAS Department of Biosciences

The Department of Biosciences was established in 1969 by late Prof. S.C. Pandeya. On the recommendation of the University Grants Commission (UGC), an integrated Post Graduate Course in Biology (M. Sc. Experimental Biology), first of its kind in the Country, was started in this Department. The Department started with its base in Environmental Sciences and in few years it took leadership in the field of ecology under the stewardship of its founder head, late Prof S. C. Pandeya. Gradually, other areas of research such as Plant Physiology, Animal Physiology & Toxicology, Neurobiology, Ornithology, Wildlife Biology and Fisheries were also integrated into the thrust areas. Later on, keeping Integrated Biology as the theme for the first year of the course, the second year was specialized into Plant Sciences (Botany), Animal Sciences (Zoology) and Microbiology. With the advancement of Biology and looking at the need of its teaching for Human Resource Development, M.Sc. Programme in Biotechnology was initiated from the year 2004. The areas of research in the Department are diversified and include Plant Physiology & Molecular Biology, Herbal Technology & Medicinal Plants, Marine & Coastal Biodiversity, Ornithology, Wildlife Biology, Fisheries Biology, Insect Biology, Extremophiles, Metagenomics, Bioremediation, Environmental Microbiology, Bioinformatics and Biotechnology.

Today the department is progressing with the major theme of Integrated Biology in diversified research areas. Department of Biosciences is offering degrees in Botany, Zoology, Microbiology and Biotechnology. Thus, this program aimed to be a platform for Human Resource Development, in the various fields of biological sciences.

Journey to Recognition and Excellence
(UGC Centre of Advanced Study in Arid Zone Biology)

The approval of the Centre of Advanced Study (CAS) by the UGC in July 2012 to the Department of Biosciences is the highest distinction that reflects the academic and research capabilities of the Department. This is a turning point in the history of the Department and certainly greatest step towards future.

In early 1980’s, UGC-SAP Programme on Desertification was approved followed by the sanction of DSA Phase 2 and 3 by the UGC. In 2001, the major infrastructural assistance programme, COSIST was also approved by the UGC followed by the award of the FIST Programme by DST, New Delhi in 2007.

During the last 10 years, the Department has received research grant worth more that Rupees 7 Crores from the Central Government (UGC, DBT, DST), Govt. of Gujarat and Industries. Currently, several projects worth Rupees 6.5 Crores are running. The Department has range of sophisticated equipments for advanced research and teaching. During the last 10 years, more than 80 Research Fellowships have been awarded to Ph.D. scholars by UGC, CSIR, DBT, MoES and Gujarat Government. The Department has published more than 300 Research Papers, 25 Books, 50 Book Chapters and 350 research papers presented in the conferences and more than 06 bacterial whole genome sequences submitted to NCBI. Department has signed several MoUs with National and International Universities and research institutions.
Global Initiatives of Academic Networks

What is GIAN

Union Cabinet has approved a programme titled Global Initiative for Academic Networks (GIAN) in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs internationally to encourage their engagement with the institutes of Higher Education in India so as to augment the country’s existing academic resources, accelerate the pace of quality reform, and elevate India’s scientific and technological capacity to global excellence. GIAN is envisaged to catalyse higher education institutions in the country, and that it will initially include all IITs, IIMs, Central Universities, IISc Bangalore, IISERs, NITs and IIITs subsequently cover good State Universities where the spinoff is vast. GIAN is an evolving scheme which will initially include participation of foreign faculty in Institutes as Distinguished / Adjunct / Visiting faculty / Professors of Practice, etc., to participate in delivering Short or Semester-long Courses. Other activities will be included in due course.

Objectives of GIAN

- To increase the footfalls of reputed international faculty in the Indian academic institute
- Provide opportunity to our faculty to learn and share knowledge and teaching skills in cutting edge areas
- To provide opportunity to our students to seek knowledge and experience from reputed International faculty
- To create avenue for possible collaborative research with the international faculty
- To increase participation and presence of international students in the academic Institutes
- Opportunity for the students of different Institutes/Universities to interact and learn subjects in niche areas through collaborative learning process
- Provide opportunity for the technical persons from Indian Industry to improve understandings and update their knowledge in relevant areas
- Motivate the best international experts in the world to work on problems related to India
- Develop high quality course material in niche areas, both through video and print that can be used by a larger body of students and teachers
- To document and develop new pedagogic methods in emerging topics of national and international interest
GIAN Course at Saurashtra University, Rajkot

Metagenomics & Microbiomes

OVERVIEW

Metagenomics, an approach to directly access and analyse the genetic content of the entire communities of the organisms in an environmental sample, applies a suite of genomic technologies and bioinformatics tools. Metagenomic field has been responsible for substantial advances in understanding microbial ecology, evolution, and diversity over the past one decade. A number of research laboratories around the globe are actively engaged in this new scientific meadow.

Trillions of bacteria live in our gut microbiome, protecting us from infection and aiding our digestion. A bad mixture of bacteria, or dysbiosis, may contribute to obesity, diabetes, cancer, Crohn’s disease, infections, and many other diseases, yet these bacterial communities are so complex that we need advanced computational tools to study them.

This course will begin by explaining major computational challenges in using metagenomic data to identify dysbiosis in human disease. The course will then present current approaches to the precision analysis of the microbial communities using DNA and RNA, including identifying pathogens, detecting geochemical gradients driving community structure, interpreting dysbiosis, and predicting hospital-acquired infections before they happen. We will cover methods for analyzing marker gene sequences, shotgun metagenomics, and bacterial gene expression (metatranscriptomics). We will also explore the use of tools from machine learning, including feature extraction, clustering, and classification, to translate descriptive models into predictive models of the microbiomes.

OBJECTIVES

The overall objectives of the course is to provide the course audience with the knowledge of Metagenomics, Sequencing technology, theoretical and practical guidance of several tools of bioinformatics, advice on sample processing, assembly, binning, annotation, experimental design, statistical analysis, data storage, and data sharing.

The specific objective of this course is to prepare participants for interdisciplinary research in computational metagenomics and microbiomics. Specific goals for the participants include:

• To understand the state of the art of clinical and environmental metagenomics research, and to be able to identify interesting open questions in the field;

• To be able to read and evaluate the scientific merit of the published metagenomics research;

• To gain skills for the analysis of the microbiome-related data sets, and to apply those skills to answer an interesting open research question.
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COURSE MODULES (Theory & Hands-on)

- Metagenomics-An overview
- Quantifying and visualizing microbial diversity with QIIME
- Predictive modelling of microbial communities using machine learning (Hands-on)
- Soil metagenomics (Hands-on)
- Metatranscriptomics
- Methods for precise taxonomic annotation of microbiome data
- QIIME (Hands-on)
- NGS in exploring metagenomics
- Analysis of metagenomics data using Bioinformatics tools
- MG-RAST (Hands-on)
- Public Data Resources of Metagenomics
- Designing a metagenomics project
- EBI (Hands-on)
- Statistical tools for data analysis

Schedule

- 20 - 25 February, 2017

Venue

- UGC-CAS Department of Biosciences, Saurashtra University, Rajkot-5, Gujarat

Number of participants

- Number of participants for the course will be limited to 50

Who should attend

- Faculty of biological sciences with an interest in environment, biological resource utilization and molecular tools
- Research scholars already working or willing to work in the near future in the above mentioned areas
- Postgraduate and M.Phil. students interested in this area, especially those who might like to venture out into research
- Environmental Scientists,
- Any person from industry/research organization interested in environmental protection and pollution

Fees

Fees for participation:

- Participants from abroad : US $200
- Participants from within India:
  - Industry personnel: ₹ 5000
  - Faculty from academic Institutions/Research Organizations: ₹ 3000
  - Research scholar/student: ₹ 2000
- The above fee includes a working lunch and tea, all instructional materials, computer uses for the tutorials and assignments, Laboratory equipment usage charges, free internet facility at the host institute during the course.
- The participants will have to take care of their travel, and dinner during the course
- The participants will be provided with accommodation on request, on payment and availability basis. Those requiring accommodation are requested to inform the coordinator well in advance.
The Faculty

INTERNATIONAL

Dr. Dan Knights
University of Minnesota, USA

Dr. Dan Knights is a computational microbiologist. He is an assistant professor in the Department of Computer Science and Engineering and the Biotechnology Institute at the University of Minnesota. Dan received his PhD in Computer Science from the University of Colorado, followed by a post-doctoral fellowship at Harvard Medical School. Knights’s computational microbiology lab develops methods that bring precision medicine to the microbiome. He applies those methods to find patterns in microbial communities that predict and diagnose human diseases, and he uses those patterns to develop novel therapeutics and diagnostics that target the microbiota. Dan has co-authored articles in top multidisciplinary journals, including numerous publications in Nature, Science and Cell. In 2015 he was named a McKnight Land-Grant Professor by the University of Minnesota.

NATIONAL

Prof. Satya Prakash Singh
Saurashtra University, Rajkot, Gujarat, India

Professor Satya Prakash Singh is currently working as Professor & Head UGC-CAS Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India. He is also coordinator of the UGC- CAS programme in the Department. He completed his masters in Microbiology from the G. B. Pant University of Agriculture & Technology, Pantnagar, India and carried out his doctoral research at the Griffith University, Brisbane Australia. Prof. Singh has worked at the National Food Research Institute, Tsukuba, Japan as visiting scientist with Dr. Kiyoshi Hayashi and also visited Yangoon University, Myanmar as visiting professor. Prof. Singh has more than 20 years of research experience on the saline habitats of the Gujarat Coast (India) and has been working on the diversity, phylogeny and enzymatic characteristics of the halophilic/haloalkaliphilic bacteria, actinomycetes and archaea of various saline ecosystems. He has published 82 research papers and contributed 17 book chapters. He is reviewer of a large number of International peer reviewed journals, including BBA, PLOS- ONE, European Journal of Soil Biology, Enzyme & Microbial Technology and Critical Review in Biotechnology. Fifteen Ph D students and 17 M Phil students have completed their research under his supervision. Prof. Singh has research collaborations with Dr. Kiyoshi Hayashi (National Food Research Institute and Toyo University, Japan), Prof. Peter Rogers (Griffith University, Brisbane, Australia), Prof. S. K. Khare (IIT, New Delhi) and Prof. Sanjay Kapoor (University of Delhi University, South Campus, New Delhi).
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Prof. G. C. Bhimani,
Saurashtra University, Rajkot, Gujarat, India

Prof. G.C. Bhimani, is currently working as a Professor & Head at Department of Statistics, Saurashtra University, Rajkot, Gujarat, India. He completed his masters and doctoral research in Statistics from the Saurashtra University, Rajkot, Gujarat, India. Prof. Bhimani is a dean, faculty of Sciences and acted as Vice Chancellor (I/C) at Saurashtra University, Rajkot. He has published 10 research papers and 5 books. 20 Ph.D. students have completed and 8 are pursuing their research under his supervision. His research interests focus on Bio-Statistics, Operation Research and Econometrics.

Prof. Ramesh Kothari
Saurashtra University, Rajkot, Gujarat, India

Prof. Ramesh Kothari, is currently working at UGC-CAS Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India. He completed his masters and doctoral research in Microbiology from the Saurashtra University, Rajkot, Gujarat, India. Prof. Kothari has worked at the University of Medicine and Dentistry of New Jersey (UMDNJ- now Rutgers University), USA as visiting researcher. He has published more than 45 research papers. Several book chapters and four are in his credit. He is reviewer of a large number of International peer reviewed journals. Six Ph.D. students have completed their research under his supervision. One post doctoral, seven doctoral and one M.Phil. students are pursuing their research under his supervision. Prof. Kothari has research collaborations with Dr. Virendra Pandey (Rutgers’ University, Newark, USA), Prof. C. G. Joshi (Anand Agricultural University, Ananda), Prof. S. K. Khare (IIT, New Delhi), Dr. A.K. Goel (DRDO-DRDE, Gwalior, India) and Prof. B. A. Golakiya (Junagadh Agricultural University, Junagadh, India). His research interests focus on bioremediation of sites contaminated with xenobiotics. He also has a strong focus in using whole genome sequencing for understanding the biodegradation of textile dyes, pesticides and other related of Poly Aromatic Hydrocarbons (PAHs) and metagenomics as well as metagenomic analysis of rumen microbiota.

Prof. C. G. Joshi,
Anand Agricultural University, Anand, India

Prof. C. G. Joshi is currently working as Professor and Head at Department of Animal Biotechnology, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, Gujarat, India. His core research area include Metagenomics, Animal Genetics & Breeding, Genomics, Bioinformatics. He has developed two softwares namely goatyle & Kamdhenu. Two patents, more than 150 international publications, several book chapters and two books are in his credit. He has completed more 7 research projects and has more than 1 lakh gene bank submission. He is member in several national scientific organization and committees. He is reviewer in several national and international scientific journals of repute.
Prof. S. K. Khare
IIT, New Delhi, India


Dr. Rajesh Patel
HNGU, Patan, India

Dr. Rajesh Patel, is currently working as an Associate Professor at Department of Life sciences, Hemchandracharya North Gujarat University, Patan, Gujarat, India. His core research area are on biodiversity & biotechnological potential of extremophiles. Besides that he is also working in the area of bioinformatics and having expertise in the Metagenomics and computer aided drug discovery

Dr. Prakash Koringa,
Anand Agricultural University, Anand, India

Dr. Prakash Koringa is currently working as an Associate Professor, at Department of Animal Biotechnology, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, Gujarat, India. His core research are Metagenomics, Molecular Genetics and Animal breeding.
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CONTACT US

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REGISTRATION CUM ACCOMMODATION REQUEST FORM

PLEASE FILL THE FORM IN CAPITAL LETTERS

A scan copy of the filled registration form duly signed by the interested participant should reach via email by 5 February, 2017. The confirmation of the admission in the course will be sent to the candidates on e-mail by 10 February, 2017.

SHORT-TERM COURSE ON
METAGENOMICS & MICROBIOMES

Name: ................................................................. M/F: ..............
Designation: .................................................................
Organization: .................................................................
Address: .................................................................
Tel.: .................................. Mobile: ................................ E-mail: ................................
Accommodation Required: Yes ☐ / No ☐

Bank account details for registration fees

Registration fees can be directly deposited through NEFT to the designated account as given below or can be sent in the form of demand draft (D.D.) drawn on any nationalized bank in favor of “Saurashtra University-GIAN-Bio-Sci-Dept.” payable at Rajkot after receiving email from the course coordinator for the confirmation of admission in the course.

- Bank Account Name: Saurashtra University-GIAN-Bio-Sci-Dept.
- Account No.: 3584620711
- Bank: Central Bank of India, Saurashtra University Campus, Munjka, Rajkot, Gujarat 360005
- IFSC code: CBIN0281313
- Last date for registration: 05 February, 2017

Date: ......................................................... Signature: .................................................................

Registered delegates are informed to carry a laptop with following configuration for hands-on session.

- Minimum 4 GB RAM, higher is more preferable.
- Minimum 50 GB free hard disk space. 10 GB in C drive. Rest in single drive (can be C drive as well).
- Operating system: Windows 7, 8, 10. Windows 7 is preferable.
- Processor: Intel 2nd gen core i3 or higher, Amd quad core or higher. Minimum 1.8 GHz.
- Working WiFi and LAN.