

**RUPA S. IYER, Ph. D.**  
**Associate Dean, Research and Graduate Studies**  
**Associate Professor**  
Department of Engineering Technology  
College of Technology  
University of Houston  
Tel: (713) 743-0099  
Email: [riyer@uh.edu](mailto:riyer@uh.edu)

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**EDUCATION**

<b>Ph.D.</b>	Michigan State University, East Lansing, MI Thesis: <i>Phenetic Analysis of <u>Leucocytospora</u> from <u>Prunus</u> and <u>Malus</u></i> Advisor: Dr. Gerard Adams	04/1992
<b>M.Sc.</b>	University of Mumbai (India) Major: Biotechnology	08/1985
<b>B.Sc.</b>	St. Xavier's College (India) Major: Life Sciences	08/1983

**POSTDOCTORAL TRAINING**

<b>Post Doc</b>	University of Texas MD Anderson Cancer Research Center, Houston, TX	1/1993- 12/1994
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**WORK EXPERIENCE**

<b>Founding Director</b>	Biotechnology Programs, College of Technology, UH University of Houston, UH	10/2005 – Present
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Responsibilities and accomplishments

- Designed, developed and implemented a new four year biotechnology undergraduate degree program and course curriculum in collaboration with industry and academia
- Procured funding from state and federal agencies in excess of \$2M to develop the program and successfully implement the program
- Created and developed an interdisciplinary research-based biotechnology laboratory curriculum and laboratory manual in collaboration with industry and academic partners
- Directed the piloting of the lab curriculum at Brigham Young University (Hawaii), and the new biotechnology laboratory at UH
- Led the program through its formal approval process from the College to the University to the Texas Higher Education Coordinating Board (THECB)
- Offered courses within the first year of the program's inception
- Directed program planning, implementation, and assessment
- Increased student enrollment from less than 6 to over 500 within 7 years of program implementation

- Initiated the first Houston International Society for Pharmaceutical Engineers Student chapter at UH
- Designed and directed construction of the new biotechnology lab facility
- Directed the certification of the equipment and training of lab personnel
- Worked with UH safety officers and lab personnel to maintain safety and biohazard standards in the laboratories
- Coordinated hiring of faculty and staff for the biotechnology program
- Initiated several recruitment events for the program, including presentations at local community colleges and high schools
- Supervise biotech staff, coordinate course schedule and laboratory maintenance
- Leading the first accreditation of the biotech program by ATMAE

**Associate Dean**

Research and Graduate Studies, College of Technology (Cot) 1/2014- present  
University of Houston (UH)

Responsibilities and accomplishments

- Served as a liaison between UH Division of Research (DOR) and Cot
- Increased limited submission slots for faculty
- Increased average research expenditures by 33%
- Increased average submissions by 136%
- Increased average awards by 180%
- Procured funding from DOR to support Cot research staff (very first time Cot research)
- Increased interdisciplinary submissions
- Upgraded Cot research staff to better faculty support for research submissions
- Collaborated with DOR to train research staff
- Hosted Cot's first "research mixer" to facilitate research collaboration among Cot faculty
- Serve as liaison between the Graduate School and Cot
- Review and approve Cot graduate applications
- Review and approve Cot new graduate courses and graduate programs
- Represent the Dean's office at Graduate Professional School Committee meetings
- Led the college transition to a new online application system, College Net
- Led the college through the first review of Cot graduate programs

**Associate Professor**

College of Technology, (UH) 9/2009 – present

Responsibilities and accomplishments

- Teach Biotechnology courses
- Developed and implemented undergraduate research for all biotech majors
- Developed assessment and evaluations for interdisciplinary laboratory curriculum
- Initiated research in environmental biotechnology
- Published 23 peer review journal papers since appointed in 2009
- Program serving as a model of integration of learning and research
- Procured funding for broad scale dissemination of the learning materials

- Assemble a unique collection of over 60 bacterial strains for research, education and commercialization
- Developing a platform for global collaboration in education and research to address STEM education and the environment

**Director** Center for Life Sciences Technology, 4/2008- Present  
College of Technology, UH

Responsibilities and accomplishments

- Initiated and developed the core vision of the Center to support education, research and outreach
- Procured funding from state, federal and industry to support core initiatives of the center
- Led the center to be consistently ranked amongst the top ten at UH in terms of external funding
- Developed training programs to support up -skilling of local biotech personnel
- Initiated and developed outreach programs to area high school teachers and high school students
- Developed workshop manuals for training programs, teacher workshops and high school biotech camps
- Directed workshops and biotechnology camps for high school teachers and students
- Developed and directed core facility for biotechnology education, research and training
- Collaborated with the CLiST board to procure research projects for the Center

**Research Associate Professor** College of Technology, UH 10/2005-8/2009

- Mentored undergraduate students on NSF funded research projects
- Initiated research program in microbial environmental biotechnology

**Instructor** Department of Biology, Wharton County Junior College, TX 6/1994 – 8/2005

- Taught introductory biology, microbiology (interactive T.V), nutrition (video based), anatomy and physiology lecture and laboratory classes
- Developed and updated microbiology lab and lecture curriculum and authored first lab manual for WCJC
- Co-authored biology lab manual
- Participated in developing and teaching first distance learning (interactive T.V and video based classes) for Biology Department.
- Coordinated Texas Undergraduate Biological Sciences conference for biology professors of two and four year colleges of Southeast Texas

**Post Doctoral Training** Department of Medical Oncology/Pharmacology, University of Texas M.D. Anderson Cancer Research Center, Houston, TX 1/1993 – 12/1993

- Investigated the effect of DNA analogs on solid tumors

**Adjunct Faculty** Department of Biology, University of Houston (Downtown) 8/1992 – 12/1992

- Taught undergraduate biology courses

**Research Assistant** Department of Botany and Plant Pathology, 9/1987 – 6/1991  
Michigan State University, MI

- Evaluated and used isozyme analysis to compare fungal isolates
- Compared 16S rRNA profiles of fungal isolates

**Teaching Assistant** Department of Botany and Plant Pathology, 1/1988 – 12/1990  
Michigan State University, MI

**Teaching Assistant** Department of Biology, Temple University, PA 9/1985 – 4/1987

### AWARDS and HONORS

- Fulbright Specialist Grant, Morocco, July 2016
- University of Houston Distinguished Leadership in Teaching Award, UH 2016-2017
- Selected, Fulbright Specialist Roster, US Department of State, 2015 -2020
- Certificate, Outstanding Cot Faculty, UH Provost, 2015
- University of Houston Excellence in Teaching Award, 2014
- Selected to participate in the first cohort UH's Chairs Leadership Academy Program, 2013- 2014
- Fluor Award for Service Excellence, College of Technology, UH, 2013
- Summer Undergraduate Research Award (SURF) Mentor, Student, Lisa Lau, 2013
- Outstanding Indian Award, teaching, India Culture Center, 2011, Houston
- Third Place award for best paper: Givmanesh, A., Iyer, R., Smith K. "Enhancing Bioreactor Functionality in Bio- Processing Courses," Proceedings of the 2011 ASEE Gulf—Southwest Annual Conference
- Nominated Who's Who among America's Teachers, 2006
- WCJC Faculty of the Year Award, 2004
- Undergraduate Faculty Enhancement Program Award, American Society for Microbiology, Board of Education and Training, 2002
- WCJC Faculty Council Chairman's Outstanding Faculty Award, 2000
- Sigma Xi Research Grant, 1989
- Thoman Fellow, Michigan State University, 1989 -1990
- Short Term Enrichment Grant from American Phytopathological Society, 1988

### GRANTS: Procured \$2M in funding as a PI

1. Principle Investigator: **Rupa Iyer**  
Title: Integration of Standards and Science Policy for the 21<sup>st</sup> Century Biotechnology Workforce  
Funding Agency: The National Institutes of Standards and Technology (NIST)  
Amount: **\$74,887.00**  
Period: 9/01/15-2/28/18
2. Principle Investigator: Rupa Iyer  
Title: Fulbright Specialist Grant, Morocco  
Funding Agency: US Department of State

Amount: **\$4,283.80**  
Period: 7/11/2016-7/25/2016

3. Principle Investigator: **Rupa Iyer**  
Title: I- Corps L: Social Entrepreneurship to Integrate Education, Research, and Training- A University of Houston Model.  
Funding Agency: The National Science Foundation (**NSF**)  
Amount: **\$50,000**  
Period: 1/2015-6/2016
4. Principle Investigator: **Rupa Iyer**  
Title: Regulations in Biotechnology (Graduate course)  
Funding: UH FDIP  
Amount: **\$4,000**  
Period: 5/2012- 5/2013
5. Principal Investigator: **Rupa Iyer**  
Title: Building a 21<sup>st</sup> Century Biotechnology Workforce  
Funding Agency: Governor's Wagner Peyser grant (**TWC**)  
Amount: **\$296,094**  
Period: 2/2011 - 1/2012
6. Principal Investigator: **Rupa Iyer**  
Title: Building a Competitive Workforce in Life Sciences and Biotechnology  
Funding Agency: Governor's Wagner Peyser grant (**TWC**)  
Amount: **\$392,604**  
Period: 5/2009 - 5/2010
7. Principal Investigator: **Rupa Iyer**, Co PI: Richard Wilson and Bill Kudrle  
Title: Interdisciplinary Research based Bioprocessing Laboratory  
Funding Agency: QEP Curriculum Development Grant Program, UH Provost Office  
Amount: **\$10,000**  
Period: 1/2009 -12/2009
8. Principal Investigator: **Rupa Iyer**  
Title: Li Cor Biosciences contribution towards the purchase of 4300 sequencer  
Funding Agency: Li Cor Biosciences  
Amount: **\$100,000**  
Period: 7/2008 – 7/2009
9. Principal Investigator: **Rupa Iyer**  
Title: Distance education and Biotechnology  
Funding Agency: Office of Instructional support and Outreach UH  
Amount: **\$15,000**  
Period: 6/2008 – 8/2009
10. Principal Investigator: **Rupa Iyer**  
Title: Biotechnology Summer Camp  
Funding Agency: Texas Workforce Commission (**TWC**)  
Amount: **\$31,500**  
Period: 6/2008 - 9/2008

11. Principal Investigator: Heidar Malki, Co-PI: Jane Yuan, Senior Personnel: Driss Benhaddou, **Rupa Iyer**, Deniz Gurkan, Farrokh Attarzadeh, Moges Mequanint, Gangbing Song  
 Title: Sensor Networks and Security infrastructure  
 Funding Agency: National Science Foundation (**NSF**)  
 Amount: **\$330,000.00**  
 Period: 1/2008 - 1/2011
  
12. Principal Investigator: **Rupa Iyer**, Co-PI: Chris Baca and Heidar Malki  
 Title: Bridges to the Future- Initiating a Comprehensive Biotechnology Program at the University of Houston  
 Funding Agency: Texas Workforce Commission (**TWC**)  
 Amount: **\$1,022,336.00**  
 Period: 8/2006 - 8/2008
  
13. Principal Investigator: **Rupa Iyer**  
 Title: From Nature to Lab to Production- Infusing Cutting Edge Research into Undergraduate Biotechnology Curriculum  
 Funding Agency: National Science Foundation, CCLI (**NSF**)  
 Amount: **\$121,880 .00**  
 Period: 12/2006 -12/2009
  
14. **Other:** Industry Contributions  
 Funding Agency: Exxon Mobil matching contribution  
 Amount: **\$25,000.00**  
 Period: 09/2009- present

**PUBLICATIONS (Refereed Journal Publications, \*\* student)**

1. 1. Iyer, R., and Damania, A. (2016). Draft Genome Sequence of *Exiguobacterium* sp. KKBO11, Isolated Downstream of a Wastewater Treatment Plant in Houston, Texas. *Genome Announcements*, 4(4), e00681-16.
  
2. Iyer, R., and Damania, A. (2016). Draft genome sequence of *Pseudomonas putida* CBF10-2, a soil isolate with bioremediation potential in agricultural and industrial environmental settings. *Genome Announcements*, 4(4), e00670-16.
  
3. Iyer, R., Iken, B., and \*\*Leon, A. (2016). Characterization and Comparison of Putative *Stenotrophomonas Maltophilia* Methyl Parathion Hydrolases. *Bioremediation Journal*, 20(1), 71 – 79.
  
4. Iyer, R., and Damania, A. (2016). Draft genome sequence of alkane-degrading *Acinetobacter venetianus* JKSF02, isolated from contaminated sediment of the San Jacinto River in Houston, Texas. *Genome announcements*, 4(2), e00286-16.
  
5. Iyer, R., and Damania, A. (2016). Draft genome sequence of *Pseudomonas stutzeri* ODKF13, isolated from farmland soil in Alvin, Texas. *Genome announcements*, 4(2), e00293-16.

6. \*Savio, A, Fletcher, J., Smith, K. Iyer, R., Bao, J., and Hernandez, Robles. (2016). Environmentally Effective Photocatalyst CoO-TiO<sub>2</sub> Synthesized by thermal precipitation of Co in Amorphous TiO<sub>2</sub>. *Applied Catalysis B: Environmental*.
7. Iyer, R., and Damania, A. (2016). Draft Genome Sequence of *Rhizobium* sp. GHKF11, Isolated from Farmland Soil in Pecan Grove, Texas. *Genome Announcements*, 4(4), e00682-16.
8. Iyer, R., and Damania, A. (2016). Draft genome sequence of *Stenotrophomonas maltophilia* CBF10-1, an organophosphate-degrading bacterium isolated from ranch soil in Fairchilds, Texas. *Genome announcements*, 4(3), e00378-16.
9. Iyer, R., and Damania, A. (2016). Draft genome sequence of the broad-spectrum xenobiotic degrader *Achromobacter xylosoxidans* ADAF13. *Genome announcements*, 4(2), e00203-16.
10. Iyer, R., and Damania, A. (2016). Draft genome sequence of organophosphate-degrading *Ochrobactrum anthropi* FRAF13. *Genome announcements*, 4(2), e00295-16.
11. Iyer, R., Smith, K., Kudrle, B., and \*\*Leon, A. (2015). Detection and Location of OP-degrading Activity: A model to Integrate Education and Research. *New Biotechnology*, 32(4), 403-411.
12. Iyer, R., and Iken, B. (2015). Protein Engineering of Representative Hydrolytic Enzymes for Remediation of Organophosphates. *Biochemical Engineering Journal*. Vol. 94, 134-144.
13. Iyer, R., Iken, B., and \*\*Leon, A. (2015). Developments in Alternative Treatments for Organophosphate Poisoning. *Toxicology letters*. Vol. 233(2), 200-206.
14. Iyer, R., Iken, B, and \*\* Damania, A. (2013) A Comparison of Organophosphate Degradation Genes and Bioremediation Applications. *Environmental Microbiology Reports*. doi: 10.1111/1758-2229.12095.
15. Iyer, R., Stepanov, V., and Iken, B. (2013) Isolation and Molecular Characterization of Novel *Pseudomonas putida* Strain Capable of Degrading Organophosphate and Aromatic Compounds. *Journal of Advances in Biological Chemistry*. (Vol 3), 564- 578.
16. Iyer, R., and Iken, B. (2013) Identification of Water-borne bacterial isolates for Potential Remediation of Organophosphate Contamination, *Journal of Advances in Biological Chemistry*, Vol. 3,146-152.
17. Iyer, R., and Wales, M. (2012) Integrating Interdisciplinary Research –based Experiences in Biotechnology Laboratories, *Journal of Advances in Engineering Education* , Vol. 3,(1) 1-35.
18. Iyer, R., and Kudrle, B. (2012) Implementation of an Electronic Lab Notebook to Integrate Research and Education in Biotechnology Program, *Technology Interface Journal*, Vol. 12, (2) 5-12.
19. Kudrle, B., and Iyer, R. (2012) A Semantic Electronic Lab Notebook for Education, *Computers in Education Journal*, Vol. 22 (3), 35-42.

20. \*Givmanesh, A., and Iyer, R. (2011) Enhancing Bioreactor Functionality in Bio- Processing Courses, *Computers in Education Journal*, Vol 21 (4), 2-12.
21. \*Givmanesh, A., Iyer, R., and Benhaddou, D. (2011) Integrated Remote Management for Bio-Processing Experiments, *International Journal of Engineering Research and Innovation*, Vol 3(1), 75 -81.
22. Iyer, R., Iken, B., and \*\*Tamez, T. (2011) Isolation, Molecular and Biochemical Identification of Paraoxon-Metabolizing *Pseudomonas* Species, *Journal of Biodegradation and Bioremediation*, Vol 2 (5), 2- 6.
23. Iyer, R., and Fitzgibbon, W. (2009) “Building the Future Biotechnology Workforce – A University of Houston Model” *Journal of Commercial Biotechnology*, Vol 15 (2), 171 -182.
24. Adams, G. C., Surve-Iyer, R.S., and Iezzoni, A. F. (2002) Ribosomal DNA sequence divergence and group I introns within *Leucostoma persoonii* and *Leucostoma cincta*. *Mycologia*, Vol. 94 (6) 947- 969.
25. Saunders, P. P., Arimilli, S., Krohn, K., Muhs, M. A., Alvarez, E. and Surve-Iyer, R.S. (1995) “Metabolism and action of benzamide ribozide in Chinese hamster ovary cells.” *Anti-cancer Drugs*, 6: 1-7.
26. Surve-Iyer, R.S., Adams G.C., Iezzoni, A.F and Jones A.L. (1995). Isozyme detection and variation in *Leucostoma* species from *Prunus* and *Malus*. *Mycologia*, Vol 87 (471-48).
27. Surve-Iyer, R. S., and Adams, G. C. (1991). Genetic comparison of ribosomal DNA in *Leucostoma* species. *Mycol. Soc. Am. News*. Vol 42 (3):45.

## CONFERENCE PAPERS

1. \*\* Mahanadi, Kavya, and Iyer, R. (2012) Remote Control of Bioreactor, *Proceedings of the 2012 ASEE Annual Conference*. San Antonio, TX.
2. \*\*Givmanesh, A., Iyer, R., and Smith K. (2011) Enhancing Bioreactor Functionality in Bio-Processing Courses. *Proceedings of the 2011 ASEE Gulf—Southwest Annual Conference*, Houston, TX.
3. \*\*Givmanesh, A., and Iyer, R., and Benhaddou, D. (2011) Integrated Remote Management for Bioprocessing Experiments. *Proceedings of the 2011 ASEE International Conference*, Hartford, CT.
4. Iyer, R.S. (2010) The Center for Life Sciences Technology – A Model for Integration of Education Research and Workforce Development. *Proceedings of the 2010 American Society for Engineering Education*, Louisville, KY.
5. Iyer, R.S. (2009) An interdisciplinary Research Based Approach to transform Undergraduate Education. *Proceedings of the 2009 American Association for Advancement of Science Conference*, Washington D. C.



6. Iyer, R.S. (2008) From Nature to Lab to Production- Infusing Cutting Edge Research into Undergraduate Lab Curriculum. *National Science Foundation, Course Curriculum and Laboratory Improvement Conference*, Washington D. C.
7. Iyer, R.S. (2008) Research Based Biotechnology Program. *Proceedings of the Council for Undergraduate Research Conference*, St. Benedict, MN.
8. Iyer, R.S. (2007) Bridges to the future- Infusing Cutting Edge Research into Undergraduate Curriculum. *Proceedings of the Annual ASEE Conference*, Honolulu, HI.
9. Surve-Iyer, R.S., and Adams, G.C. (1991) Genetic Comparison of r-DNA of *Leucostoma* species. *Proceedings of the Annual American Institute of Biological Sciences Meeting*, San Antonio, TX.

### **PUBLISHED BOOKS**

1. Iyer, R.S., and Pinson, D. L., 2004, “*Laboratory exercises in Microbiology*” 2<sup>nd</sup> Edition. Heritage Publishing Company. Wharton, TX.
2. Jeffery, J. Raun, K., Glenn, D., Partlow, N., Gadkari, P., Iyer, R.S., Walker, D., Pinson; D. and Dees, K., 2001. “*Laboratory Manual for General Biology*” Kendall Hunt Publishing Company, Dubuque, IA.
3. Iyer, R.S and Pinson, D. L., 2000, 1<sup>st</sup> Edition. “*Laboratory exercises in Microbiology.*” Heritage Publishing Company, Wharton, TX.

### **PUBLISHED BOOK CHAPTER**

1. Iyer, R., “An Interdisciplinary Undergraduate Biotechnology Program at the University of Houston,” chapter published, 2009, Best Practices in Biotechnology Education. Editor Yali Freidman, pg.183 -194.

### **CONFERENCE, WORKSHOPS and CAMPS**

1. **Organized-** Regional NSF I- Corp Workshop, July 2015, University of Houston, Houston, TX.
2. **Organized** -Biotechnology Teacher Workshop, June 2008, Center for Life Sciences Technology, UH, Houston, TX.
3. **Organized**-Short Courses in Biotechnology, August, 2008, Center for Life Sciences Technology, UH , TX
4. **Organized**-STEM Biotechnology High School Camps, 2015 – 2008, Center for Life Sciences Technology, UH, TX.

### **WORKSHOP MANUALS**

1. Iyer, R.S “Environmental Sampling -An Open Education Resource to Integrate Learning and Research” Fulbright Specialist Project, July 2016, Ifrane and Tangiers, Morocco.
2. Iyer, R.S., and Smith, K., “An Adaptable Scalable Method for Impactful Undergraduate Research”, Regional NSF I Corp Conference, July 2015, Houston TX.

3. Iyer, R., and Sen P. R., “Biotechnology Teacher Workshop,” June 2008, Center for Life Sciences Technology, Houston, TX.
4. Iyer, R., and Sen P.R., “Biotechnology Camp for High School Students,” July 2009 Center for Life Sciences Technology, Houston TX.
5. Iyer, R.S., Pondell, S. R and Yarbrough “Short course in Biotech Clinical Practices and Biomanufacturing Practices,” August 2008, Center for Life Sciences Technology, Houston, TX.

## INVITED PRESENTATIONS

1. Iyer, R.S (2016) “ Interdisciplinary STEM Program Development and Administration” Faculty of Sciences and Techniques of Tangier, **Abdelmalek Essaadi University**, Tangier, Morocco
2. Iyer, R.S (2016) “Environmental Sampling- An Open Education Resource to integrate Learning and Research” **Al Akhawayn University**, Ifrane, Morocco.
3. Iyer, R. (2016) “Platform for Education and Research Collaboration” Presentation at conference **Panama Counsel General**, Houston, TX.
4. Iyer, R. (2016) “Undergraduate Research Experiences in the Biotechnology Program,” invited **presentation UH Honors biomedical Science Program**, Houston, TX.
5. Iyer, R.S. (2015) “Environmental and Health Threats: The Houston Ship Channel and Surrounding Areas” **Houston Oil and Gas Supply Chain Resilience, Department of Homeland Security Workshop**, Galveston, TX, invited speaker.
6. Iyer, R.S. (2013) “An Overview and Best practices of Biotechnology Education and Research at the University of Houston” Jackson State University, Jackson, invited as part of **Jackson State University’s Distinguished Lecture Series**, Jackson, MS.
7. Iyer, R.S (2012) “UH Biotechnology,” John’s Hopkins University. **1<sup>st</sup> Annual International Bio entrepreneurship Education Conference**. Baltimore, MD.
8. Iyer, R.S. (2012) “Biotechnology Programs at UH,” **University of Tangiers, Morocco**, Presented a workshop to discuss and explore collaborations with the research- based biotechnology curriculum, Tangier’s Morocco.
9. Iyer, R.S. (2010) “Are you ready for the Bio –Century.” **Challenges and Solutions in Medicine Conference**, Houston, TX.
10. Iyer, R.S. (2010) “Center for Life Sciences Technology – A Model for Integration of Education Research and Workforce Development.” **ASEE Annual Conference and Exposition**, Louisville, KY.
11. Iyer, R.S. (2009) “An interdisciplinary Research-based Approach to transform Undergraduate Education.” **American Association for Advancement of Science Conference**, Washington D.C.
12. Iyer, R.S. (2009) “Biotechnology Programs at the University of Houston.” **St. Xavier’s College. Mumbai, India.**

13. Iyer, R.S. (2009) “Learn Something New.” **American Society for Microbiology Conference**, Fort Collins, CO.
14. Iyer, R. S. (2009) “Nurturing STEM through Biotechnology.” **Evolving Technology Education in Texas, Texas Workforce Forum**, Austin, TX.
15. Iyer, R.S. (2008) “Research-based biotechnology Program.” **Council for Undergraduate Research Conference.**” St. Benedict, MN
16. Iyer, R.S. (2007) “Bridges to the future- Infusing cutting edge research into undergraduate curriculum.” **2007 Annual ASEE Conference**, Honolulu, HI..
17. Iyer, R.S. (2007) “New Biotechnology Programs at University of Houston,” **Presentation at the Biomedical Technology Club.** Houston TX..
18. Surve-Iyer, R.S., and Adams, G.C. (1991) “Genetic Comparison of rDNA of *Leucostoma* species.” **1991 Annual American Institute of Biological Sciences Conference**, San Antonio, TX.

## INVITED WORKSHOP

1. Iyer, R.S., (2009) “Learn something new” workshop on new trends in microbiology by **The American Society of Microbiology**, Fort Collins, CO, May.

## TEACHING and STUDENT LEARNING

**University of Houston, Houston, TX**

04/2008-Present

### *New Program Development*

**Master of Science in Engineering Technology, Biotechnology Track:** Led the approval, design and development of MS in Engineering Technology, Biotechnology track. BTEC is highly inter- and multi-disciplinary, and builds on existing resources available in the College of Technology and the University of Houston. The applied nature of the track is very well aligned with the mission of the College of Technology.

### *New Courses Created*

1. BTEC 6100 - Seminar
2. BTEC 6301 - Advanced Biotechnology Techniques and Methods
3. BTEC 6401 - Bioprocessing in Biotechnology
4. BTEC 6302 - Regulations in Biotechnology
5. BTEC 6303 - Protein Engineering Technology
6. BTEC 6304 - Computational Methods in Biotechnology
7. BTEC 6300- Standards in Biotechnology

### *New Courses Developed*

1. BTEC 6100 - Seminar
2. BTEC 6301 - Advanced Biotechnology Techniques and Methods
3. BTEC 6401 - Bioprocessing in Biotechnology

4. BTEC 6302 - Regulations in Biotechnology
5. BTEC 6300- Standards in Biotechnology

### *New Degree Created*

**Bachelor's in Biotechnology:** Designed, developed, created, and implemented a new degree program in Biotechnology at UH. Proposed eight new biotechnology courses for the new degree program. The program received official approval from the Texas Higher Education Coordinating Board in spring 2009. Development of the program and seed funding for equipment was funded by the Governor's Texas Cluster Initiative of **\$1,022,336, the largest to the University to develop an academic program.** Program started with fewer than 10 students in 2008, and has over **500** declared majors fall 2016. Program accredited in November 2015 by Association of Technology, Management, and Applied Engineering (ATMAE)

### *New Courses Created*

1. BTEC 1322 - Introduction to Biotechnology
2. BTEC 2320 - Biotechnology Regulatory Environment
3. BTEC2321 - Current Good Manufacturing Techniques
4. BTEC 3100 - Biotechnology Research Methods/Applications
5. BTEC 4101 - Principles of Bioprocessing Lab
6. BTEC 4301- Principles of Bioprocessing
7. BTEC 3303 - Quality Assurance and Quality Control in Drug and Biologics
8. BTEC 3301- Principles of Bioinformatics/Genomics and Proteomics
9. BTEC 4350 - Capstone Experience

### *New Courses Developed*

1. BTEC 1322 - Introduction to Biotechnology
2. BTEC 2320 - Biotechnology Regulatory Environment
3. BTEC2321 - Current Good Manufacturing Techniques
4. BTEC 3100 - Biotechnology Research Methods/Applications
5. BTEC 4101 - Principles of Bioprocessing Lab
6. BTEC 4301 - Principles of Bioprocessing
7. BTEC 3303 - Quality Assurance and Quality Control in Drug and Biologics
8. BTEC 4350 - Capstone Experience

### *Courses Taught*

1. BTEC 1322 - Introduction to Biotechnology
2. BTEC 2320 - Biotechnology Regulatory Environment
3. BTEC 3100 - Biotechnology Research Methods/Applications
4. BTEC 4101 - Principles of Bioprocessing Lab
5. BTEC 4301 - Principles of Bioprocessing
6. BTEC 5350- Capstone Experience

**Wharton County Junior College, Wharton, Texas**

06/1994-08/2005

1. BIOL 2420 - Microbiology
2. BIOL 1406 - General Biology I
3. BIOL 1322 - Nutrition
4. BIOL 2401 - Human Anatomy and Physiology I (Lecture/Lab)

## ADVISING and STUDENT SUCCESS

As the founding director of Biotechnology programs, I worked closely with Cot's academic advising department and advised new incoming biotechnology majors. Advising included, but was not limited to, discussing course content, career opportunities and placement. Since the program was new, I participated in several recruitment events to provide information about the new program. I was the founding Faculty advisor for International Society for Pharmaceutical Engineers UH Chapter, and currently am the faculty advisor Society for Biological Engineers.

## MENTORING UNDERGRADUTES RESEARCH (outside of classroom)

Mentored and supervised undergraduate research of students from College of Technology, Natural Sciences and Math, Honors College, and other universities.

1. **Brandon Bell**, UH biotechnology major, NSF REU recipient, "Naturally occurring enzymes for detection of organophosphorous," compounds, funded by the National Science Foundation (NSF) summer 2008.
2. **Vinskey Louissaint**, New Jersey Institute of Technology, NSF REU student. "Biosensors to detect organophosphorous compounds," funded by the National Science Foundation, summer 2008.
3. **Roland Tsai**, UH biotechnology major, "Comparison of intergenic spacers in the 16S rDNA of two unknown organophosphorous degrading microbes," funded by TWC grant, fall 2009.
4. **Jeff Spencer**, UH Biology/Biochemistry major, "Overview of Organophosphorus Genes," summer 2010.
5. **Daniel Mansour**, UH Biotechnology major, NSF REU recipient, "Identification and characterization of two organophosphorous degrading isolates," funded by NSF, summer 2010.
6. **Kristy Kirkman**, Biology/ Biochemistry major, Comparison of ITS region of organophosphorous degrading isolates," funded by TWC, summer 2010 - summer 2012.
7. **Tim Tamez**, UH Biology/Biochemistry major, "Timed degradation and tolerance of organophosphorous compounds by seven unknown isolates," funded by TWC grant, spring 2011.
8. **Ajesh Pillai**, UH biotechnology major, "Characterizing pesticide degrading activity of unknown isolates from water samples," summer, 2011.
9. **James Leba**, UH biotechnology major, "Genomic Libraries of OP Degrading Strains," summer 2012.
10. **Lisa Lau**, UH biotechnology major, SURF recipient, "Microbial Degradation of Pharmaceutical Waste," SURF recipient, summer 2013.
11. **Alex Leon**, UH biotechnology major, "Quantification of OP degradation in Wild Type Strains" undergraduate research, summer 2012 – 2014
12. **Jerry B. Krieger**: Screening of environmental isolates for growth and utilization of OP insecticides, glyphosate, and 1,4 dioxin, 2014 - 2015
13. **Annette Frenk**, "Assessment of monooxygenase genes involved in the biodegradation of 1,4 dioxin," summer 2015.
14. **Navya Kartha**, Soil metagenomics of OP- degrading environmental isolates, summer and fall 2015-2016.

15. **Nesma Khalil**, “Degradation Kinetics databases of OP degrading Bacteria,” Fall 2015- Spring 2016.

#### **UNDERGRADUATE RESEARCH DAY PRESENTATIONS:**

1. **Alejandra Cerda**: Identification and Degradation Analysis of *Pseudomonas* Sp., Fall 2015.
2. **Gabriella Conrado**: Organophosphorous Compound Degradation and Identification of Unknown Samples’, Fall 2015.
3. **Navya Kartha**: Metagenomics Analysis of Soil Microbes and Degradation Genes, **Best Poster Award**, fall 2015.
4. **Ebanga Tanyi**: Methyl Parathion Degradation in *Citrobacter freundii* and *Pseudomonas aeruginosa*, fall 2015.
5. **Lisa Lau**, UH biotechnology major, SURF recipient, “Microbial Degradation of Pharmaceutical Waste,” **SURF recipient**, summer 2013.

#### **UNDERGRADUATE HONORS THESIS COMMITTEE**

1. **Kristopher Reaves**: “Analysis of Thermal Residual Stress on Large Thickness Polypropylene field joints as a Reel- Lay System,” spring 2016.

#### **GRADUATE STUDENTS SUPERVISED**

The college of Technology does not offer a Ph.D. program. The Biotechnology MS track in Engineering Technology was recently approved in 2015. I have actively recruited and supervised graduate students from other departments.

1. Master’s Graduate - advisor /Chair  
**Hemen Hosseinzadeh**, A site survey analysis of Polycyclic Aromatic Hydrocarbons (PAHs), Chlorinated Aromatic Hydrocarbons (CAHs), and toxic metals at Texas superfund sites, expected spring 2017
2. Master’s Graduate- advisor /Chair  
**Dipti Jagtap**, Comparison of naphthalene degradation pathways in bacteria isolated from coastal Texas Superfund sites through stable isotope probing, expected fall 2016
3. Master’s Graduate- Committee member  
**Jennifer Nguyen**, Presence of Carbon –based Nanostructures in Electron –Beam Irradiated Food Products, 2013
4. Master’s Graduate chair/advisor  
**Kavya Mandhadi**, Remote Control of Bioreactors, 2012
5. Master’s Graduate chair /advisor  
**Ali Givmanesh**, Enhancing Bioreactor Functionality, 2011
6. Master’s Graduate – Committee member  
**Amal Kennedy Savio**, ET Master’s student Characterization Protocol for Titanium dioxide (Anatase Rutile) Use in Photocatalytic Applications, 2011

7. **Quyen Tran**, Biology/Biochemistry Ph.D. candidate, conducted his lab rotation in the biotechnology lab as part of his Ph.D. requirement, 2010

## **FIRST PROGRAM ACCREDITATION**

Led the accreditation of the first biotechnology program in the country. Program accredited in 2015 by the Association of Technology Management and Applied Engineering Board of Accreditation (ATMAE).

## **INTERNATIONAL COLLABORATIONS and CURRICULUM ADOPTION**

The biotechnology laboratory curriculum is being adopted and implemented by St. Xavier's University in India. As a Fulbright Specialist grantee I will assist in STEM administration and implementation in Al Akhawayen University and Tangier's University in Morocco.

## **PROFESSIONAL SERVICE**

### **University/Departmental Service**

1. **Faculty Representative**, Federal Demonstration Partnership (FDP), FDP is a cooperative initiative is a cooperative agreement among federal agencies and universities to reduce administrative burdens associated with research grants and contracts. 4/14- present
2. **Associate Dean**, Research and Graduate Studies, College of Technology, 1/2014- present
3. **Founding Director**, Biotechnology Programs, College of Technology, UH, 2006- present.
4. **Director**, Center for Life Sciences Technology, College of Technology, UH, 2008- present.
5. **Member**, Graduate School and Professional Council, Evaluation Committee, UH , 2012- present
6. **Grant reviewer**, National Science Foundation (NSF), ATE (Advanced Technological Education) and Course Curriculum and Laboratory Improvement (CCLI) review panel, since 2002
7. **Panel Chair**, National Science Foundation ATE review panel, 2004.
8. **Member**, Advisory Board, Life Science Technology Forum, Rice University, Houston TX, 2009, 2010, 2011
9. **Founded**, International Society of Pharmaceutical Engineers, Houston Student Chapter, UH, 2008.
10. **Faculty advisor**, International Society for Pharmaceutical Engineers Chapter, 2008- 2013
11. **Committee Member**, Scholarship Committee, College of Technology, UH, 2010- 2012.
12. **Committee Chair**, Biotechnology Lab manager Search committee, College of Technology, UH, 2009.
13. **Committee Member**, Bioresearch Day Planning Committee, University of Houston, 2009.

### **Professional Societies**

1. **Session Chair**, Annual ASEE- GSW Conference, Houston, TX, 2011.
2. **Reviewer**, ASEE Conference Papers, 2010, 2011.
3. **Panel Member**, Southeast ISPE Chapter Feb 2007 Galveston: Current Trends in Biotechnology Industry.
4. **Member**, American Society for Microbiology, American Society for Engineering Education (ASEE).

## **Community Service, Outreach and Recruitment**

1. Symposium Speaker and biotech presentation, DeBakey High School for Health Care Professionals, 2014, 2015, Houston TX.
2. Board Member, Save A Mother, A U.S. based non-profit organization that connects poor pregnant women in rural India to health resources, 2012 – present.
3. Board Member and Education Chair iEducate USA. A local non- profit organization that provides paid undergraduate tutors in low performing Houston Independent School districts to improve Math and Science skills, Houston, TX 2012- 2013
4. Organizer, Biotechnology High School Summer Camps, Center for Life Sciences Technology, Houston, TX, 2008, 2009, 2011.
5. Organizer, Biotechnology High School Summer Workshop, Center for Life Sciences Technology, Houston, TX, 2008, 2009, 2011.
6. Organizer, Biotechnology Training Workshops for Industry Professionals, Center for Life Sciences Technology, University of Houston, Houston, TX, 2008, 2009, 2011.
7. Hosted Mars Solar Rover Contestants from the greater Houston area Middle and High School, Center for Life Sciences, University of Houston, 2009, 2010, 2011.
8. Board Member, Indo American Charity Foundation, Houston, TX, 2007- 2010.

## **Other**

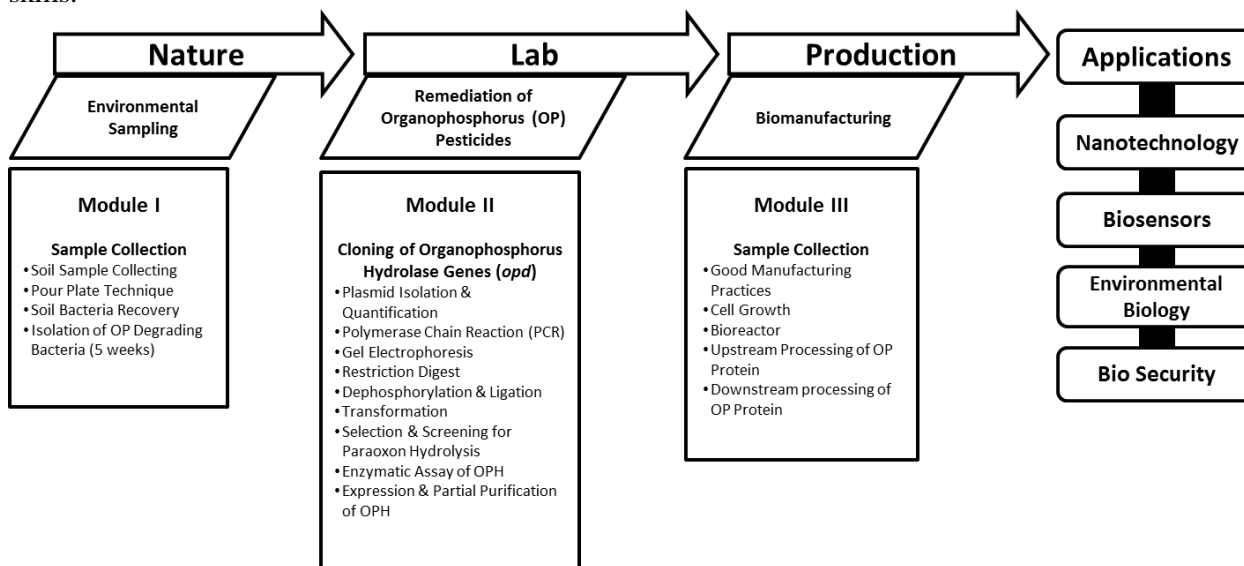
1. Judge, Houston Science and Engineering Fair, Houston, TX, 2009, 2010.
2. Career Day Speaker, Fort Settlement Middle School, Sugar Land, TX, Feb. 2011.



# SCHOLARLY/CREATIVE WORKS - REPRESENTATIVE WORKS

## 1. Scholarship of Integration: Interdisciplinary Research-Based Biotechnology Laboratory Curriculum

Created, designed, developed and successfully implemented an interdisciplinary research-based biotechnology modular laboratory curriculum within the biotechnology program at the University of Houston (UH) (Fig.1). A typical lifecycle of a biotechnology product (discovery, research and development, manufacturing and commercialization) provides a framework to integrate the requisite cross-disciplinary skills.

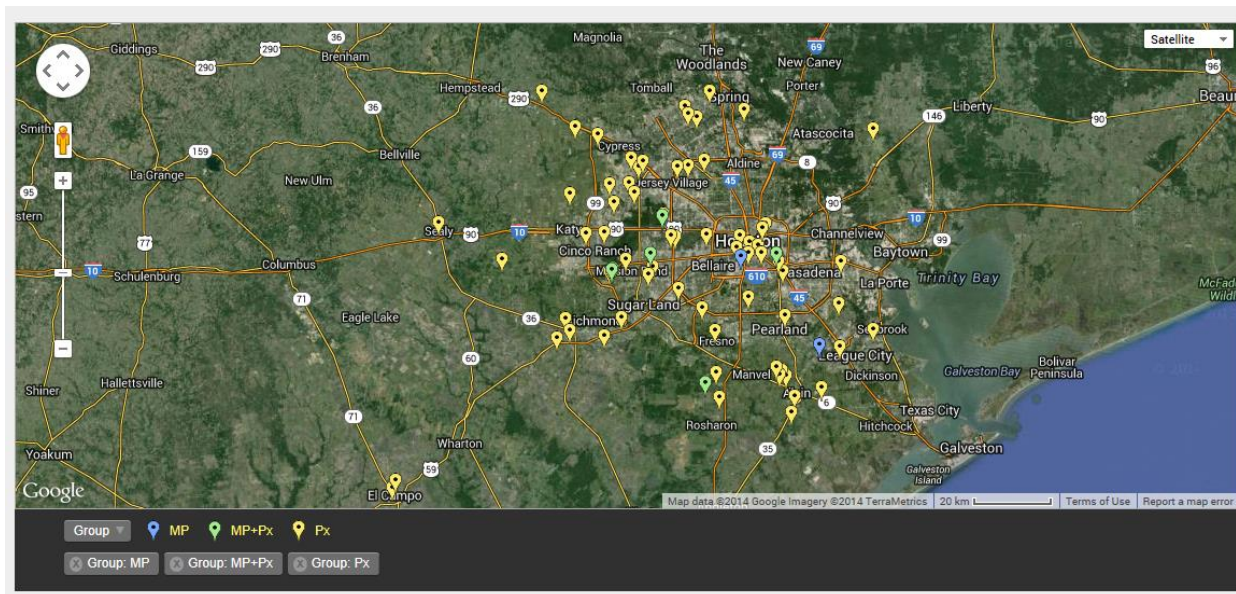


**Figure 1: Interdisciplinary Research-based Biotechnology Laboratory Curriculum**

The laboratory curriculum, developed in collaboration with industry and academic partners infuses twenty years of research into undergraduate laboratories use an organophosphorus-degrading bacterium, *Brevundimonas diminuta*, as an anchor organism to demonstrate the lifecycle of a typical biotechnology product. Three sets of activity modules use a guided inquiry-based method to take students through the process of scientific discovery and investigation to and to follow its applications in the real world. Students then apply these concepts and techniques to independently-designed investigations. Module I is an **environmental sampling research module (ESRM)**, which demonstrates the discovery process and consists of the collection of environmental soil samples to isolate organophosphorus (OP)-degrading microbes (pesticides and chemical nerve agents belong to this category). Module II introduces techniques that include isolating, cloning, and transgenic expression of the OP-degrading gene. The aim of this module is to demonstrate the research activities that are normally conducted following a discovery with a potential commercial application. Module III consists of activities that emulate production of a biotech product; in this case activities that are related to growing transformed cells in a bioreactor for optimum production, which is then followed by purification of the recombinant protein using traditional downstream processes. All three modules are part of the undergraduate biotechnology degree program and have been successfully integrated over the past seven years into two biotechnology laboratory courses at UH: Module I and II into BTEC 3100 *Biotechnology Research Methods and Applications* and Module III into BTEC 4100 *Principles of Biomanufacturing* courses.

## 2. Scholarship of Teaching: Enhancing STEM skills by Engaging Students in Undergraduate Research

All students in the biotechnology program conduct undergraduate research as part of their lab curriculum. The environmental sampling research module (ESRM) engages students in an authentic, ongoing research activity to populate a database of the geographic distribution of environmental contamination. This allows them to contribute to research that is *relatable* and *understandable*, an experience often unavailable in standard laboratory instruction. Authentic research experiences, which include unpredictable outcomes and the need for informed decision making and data interpretation, are able to engage students through a sense of ownership; this level of immersion is not possible in a lecture format setting. Through this activity, students test soil and water samples to identify and isolate bacterial strains which degrade toxic compounds, enter the location and distribution of toxin-degrading activity on the Google map location using color code pins (yellow is positive for paraoxon, blue is positive for methyl parathion, green is positive for both) and present and submit a research paper comparing soil samples for pesticide degradation based on the OP degrading database (**Fig 2**). The ESRM is therefore an investigative/discovery module that provides research experience for students as they are challenged to pose questions, develop hypotheses, and collect data to support or refute their hypotheses. The students are therefore, designing and contributing to the making of the environmental database of toxin degrading activity. Seven years of implementation of the student-driven ESRM into the undergraduate biotechnology laboratory curriculum at UH has provided significant data on the location and distribution of environmental contamination in the greater Houston area, as well as a growing collection of bacterial strains which degrade toxic compounds (**Fig 2**).



**Figure 2. Google Map with color-coded pins for positive sample collection.** Negative samples not shown to due to high volume.

### 3. Scholarship of Learning -Active Learning and Effective Use of Technology

In addition to providing research experiences, I have developed the ESRM as an effective learning experience to engage students in collaborative learning experiences that integrate a variety of STEM skills, including writing, critical thinking, quantitative literacy, data analysis and computational thinking (Table 1.).

**Table 1: STEM learning outcomes mapped to Environmental Sampling Research Module (ESRM)**

Student Activity	Example	Intended Learning Outcomes	Applied STEM Skills	What we have done or are planning on doing
Project design and hypothesis building	Search through relevant scientific publications for information to develop a senior research project on the microbial strains previously isolated through the ESRM.	(1), (2), (5)	CT, C	All student capstone projects have a mandatory literature review before any laboratory or computer work is done.  Weekly meetings with the faculty instructor help to connect this information into a working hypothesis and establish experimental protocols for student research projects.
Microbial identification and genotypic analysis	Resolve the identity of collected microorganisms and determine the sample frequency and relatedness of our OP-degrading organisms.	(2), (3)	MS, CS, BI	16S rDNA and FAME analysis are used to identify isolates that show positive results from the ESRM.  This data is then tabulated to determine how often a particular genera or species is found to be OP-degrading.
Statistical analysis of degradation of OP-degrading microorganisms	Determine the statistical significance of OP degradation kinetics.	(2)	CS, BI, C	Students are shown how to calculate and add confidence limits to degradation data.  T-tests are also conducted by students to determine if a statistically significant difference exists in the metabolic product formed over time between student samples and control strains.
Dissemination of novel properties of OP-degrading microorganisms	Explain their research through an oral presentation and a written paper as well as disseminate the potential commercial applications to interested audiences.	(6)	CL, C, EP	Student research data is often distributed through student presentations as well as in publications.  Research data is also in the process of being incorporated into a database that would be connected to the BTEC 3100 ELN allowing interested parties to see relevant information on tested soil isolates.
<p><b>STEM Skills</b>            PS – Problem solving; CT - Critical thinking; QL – Quantitative literacy;            MS – Modeling and simulation; CL – Collaborative learning; CS – Computer Science; BI - Bioinformatics; C – Communication; EP – Entrepreneurship</p>				

#### **4. First Accredited Biotechnology Program by Association of Technology Management and Applied Engineering (ATMAE)**

##### **Biotechnology Course Outcomes, Assessments, and Program Objectives**

These were developed in collaboration with Dr. Miguel Ramos, Director for Institution Effectiveness, Assessment, and Accreditation and Dr. Diana Keosayian, Director of Assessment, Cot. These were developed in preparation for accreditation. Assessments and evaluation consists of the following:

##### **Student Surveys**

A self-assessment of student learning and attitude using the Student Assessment of Learning Gains ([SALG](#)) was used during program implantation to gauge student interest. Preliminary SALG results indicate that students perceived learning gains with the interdisciplinary research-based approach used in the biotechnology curriculum, and they were positive about the learning environment.

##### **Mid Semester Surveys**

Students complete a mid-semester survey to provide feedback on instruction and course content.

##### **Documentation of Lab data and Lab Journal**

Student keep their own lab journal write lab protocols, document data, enter results and interpret their data. This lab journal is part of their assessment for the final grade.

## 5. Curriculum Map of Biotechnology Program Learning Outcomes and Course Outcomes

BIOTECHNOLOGY COURSE	PROGRAM LEARNING OUTCOMES							
	1	2	3	4	5	6	7	8
BTEC 1322: Introduction to Biotechnology	X							
BTEC 2320: Biotechnology Regulatory Environment		X		X			X	
BTEC 3321: Good Manufacturing Practices in Biotechnology		X		X				
BTEC 3100: Biotechnology Research Methods and Applications	X	X	X		X	X		X
BTEC 3301: Principles of Genomics/Proteomics and Bioinformatics	X	X			X	X		
BTEC 3320: Introduction to Quality Assurance and Quality Control in Biotechnology		X		X				
BTEC 4101: Principles of Bioprocessing Lab	X		X			X		X
BTEC 4350: Senior Capstone Experience	X	X	X		X	X		
BTEC 4300: Principles of Bioinformatics	X	X			X	X		
BTEC 4301: Principles of Bioprocessing	X	X						

### Program learning outcomes

Students graduating from the Biotechnology program will demonstrate:

1. Knowledge of biotechnology concepts (C)
2. Technical knowledge that supports biotechnology research activity (T)
3. Hands-on technical skills necessary for supporting biotechnology research activity (H)
4. Knowledge of industrial regulations and the regulatory environment in the biotechnology industry (I)
5. Ability to apply research strategies to solve biotechnology problems (R)
6. Ability to communicate effectively with appropriate audiences (CM)
7. Understanding of management tools and concepts (M)
8. The ability to work effectively in teams (TM)

## Major Works in Progress

### A. Scholarly/Creative Impact beyond University- Building a Global Learning Community

The overall goal is to:

- Disseminate and implement the environmental sampling research module into varied courses at diverse institution types nationally and globally as an inquiry-based undergraduate research experience
- Generate a data base of geographic land distribution and location of bacterial toxin degrading activity
- Identify novel strains of bacteria with potential application in health, energy and the environment.
- Use the database to infuse a variety of learning opportunities and STEM skills
- Use the database to share and conduct interdisciplinary research in environmental biotechnology
- Initiate a collection of toxin degrading bacterial strains at the University of Houston.
- Develop a global platform for integration of research and learning

### Engaging a Global Learning Community



#### Local

- UH BTEC
- Prairie View A&M
- Lone Star College



#### National

- BYU-Hawaii
- Jackson State
- Purdue
- Louisiana Tech
- RIT



#### Global

- St. Xavier's (India)
- Fulbright Specialist (5 years)

### Addressing two Social Issues : STEM and the Environment

## B. Spatial and genomic analysis of bacterial biomarkers to investigate the transport and remediation of harmful contaminants in water and soil – An interdisciplinary approach to correlate cancer clusters to local environmental contaminants

This project seeks to identify local environmental contaminants, geographically correlate them with reported elevations in cancer cases, and potentially uncover and/or engineer bacterial strains to degrade and remediate these site of contamination. Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) are highly recalcitrant carcinogens and teratogens that readily bioaccumulate in animal tissue and spread throughout the food chain. A report from 2015 by the Texas Department of State Health Services (TDSHS), revealed greater than expected incidences of childhood cancers of rare retinoblastoma, brain, and kidney in the communities of eastern Harris County. Of particular note are communities within three census tracts that surround the Superfund site and border outlying areas of the San Jacinto River (See Fig. 1)



**Fig.1 Location of cancer clusters in reference to SJR Waste Pits Superfund.** The location of the Superfund is marked in red. Three census tracts with elevated cancer numbers (2525, 2529, and 2533) are also shown.

My laboratory houses a collection of over 60 OP-degrading microorganisms representing nearly a dozen distinct bacterial genera including representative species of *Pseudomonas*, *Stenotrophomonas*, *Achromobacter*, *Ochrobactrum*, *Rhizobium*, and *Acinetobacter* among several others. In addition, whole genome shotgun (WGS) sequencing data of 9 of our best OP degraders, deposited in the National Center for Biotechnology Information (NCBI) database, consistently revealed degradation genes with putative pathways against herbicides, petroleum hydrocarbons, and organic solvents. One isolate in particular, a strain of *Achromobacter xylosoxidans* (LSMI00000000), was noted to possess dioxygenase and aromatic ring hydroxylase enzymes that could putatively target chlorinated and non-chlorinated dioxin and dibenzofuran waste.

The goals of this project are:

- (1) Conduct a spatial and genomic analysis using bacterial biomarkers to investigate the transport and remediation of harmful contaminants in water and soil.
- (2) Use indigenous wild-type bacteria that have acquired the ability to degrade toxic compounds and investigate safe and alternative methods for remediation of toxic waste.
- (3) Engineer best degraders to improve activity against PCDD/PCDF substrates using a combination of molecular modeling and enhanced bio-stimulation. Activity will be assessed by analyzing metabolic byproducts via gas chromatography-mass spectrophotometry.

The findings of this multidisciplinary project have the potential to inform future research and could have multiple benefits including: (1) Improved health outcomes for surrounding communities, (2) A tested, reproducible scientific model of collecting, identifying and using toxic waste degraders, and (3) A collection of newly engineered bacterial strains available for further research.

### C. Integration of Education, Research, and Entrepreneurship

