The mission of the Biotechnology Research Center (BRC) is to promote education and research in the areas of molecular biology, biochemistry, genetics, genomics, bioinformatics and biotechnology for the benefit of society and the environment. The major focus is on fostering interdisciplinary research at MTU and being recognized for research excellence, dissemination of knowledge, and commitment to quality education in the life sciences. Three main activities of the BRC are fostering collaborative research in biotechnology, helping to provide state-of-the-art research facilities in which to conduct research, and contributing to educational opportunities in biotechnology.

The Biotechnology Research Center continues to attract faculty from a range of disciplines varying from chemical engineering to kinesiology & integrative physiology as evidenced by the addition of five new members in 2014 (Aparna Deshpande, Xuan Liu, Zhiying Shan, Marina Tanasova, Yordan Yordanov, Ye Sun, and Ebenezer Tumban). We welcome these new members, most of whom are beginning their careers as assistant professors at MTU, into our Center and look forward to many new ideas and innovations from them. Our Center continues the tradition of excellence in research, student training and outreach for the benefit of society and the environment with over $12.3 million in 55 research grants and contracts with the major portion coming from the primary national funding agencies. Through the collective efforts from the members and the renewed focus on securing large research funding, BRC has experienced the largest new research awards of $4.6 million in 2014, which is twice the number in 2013. The increased in new research awards will lead to increased research expenditure in following years.

The diversity of our research interests is reflected in the range of funding agencies including the National Science Foundation, National Institutes of Health, the United States Department of Agriculture, US Department of Energy, and the US Department of Education. This diversity is also reflected in the titles of the 87 research publications in 2014. Also, in 2014, the BRC has supported research infrastructure at MTU with expenditures of over $15,500 to purchase instrumentation valued at more $222,115. These funds have been primarily used by junior faculty to supplement start-up allocations. We have supported our 77 graduate students, 15 postdoctoral researchers/research scientists and 82 undergraduate students with travel awards, fellowships, and cash awards and prizes for outstanding presentations at our annual biotech exposition. Also, as part of our outreach activities this year, BRC also partially funds for the BRC seminar series. Infrastructure development and student training are core activities that exemplify our conviction to directly and effectively support life sciences research at Michigan Technological University.

### BRC 2014 at a Glance

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty members</td>
<td>49</td>
</tr>
<tr>
<td>Ph.D. students</td>
<td>64</td>
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<tr>
<td>Undergraduate students</td>
<td>85</td>
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<tr>
<td>SURF and Other Awards</td>
<td>28</td>
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<tr>
<td>Active research projects</td>
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<tr>
<td>Total Research Funding</td>
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<tr>
<td>Research scientists/associates</td>
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<td>M.S. students</td>
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<tr>
<td>Summer Internships</td>
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<tr>
<td>Peer-reviewed publications</td>
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<tr>
<td>New research awards</td>
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</tr>
<tr>
<td>Research Expenditures</td>
<td>$2,117,627</td>
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</tbody>
</table>
Current BRC Support Team

**Director**
Keat Ghee Ong

**Staff Assistant**
Mary Tassava

**Executive Committee**
Victor Busov (SFRES*)
Jason Carter (CSA)
Jeremy Goldman (COE)

**Travel Grant Committee**
Oliver Gailing, Chair (SFRES)
Feng Zhao (COE)
Lanrong Bi (CSA)

**Seminar Committee**
Ashutosh Tiwair, Chair (CSA)
David Shonnard (COE)
Hairong Wei (SFRES)
Leah Vucetich (SFRES)

* COE: College of Engineering; CSA: College of Science and Arts; SFRES: School of Forest Resources and Environmental Science

BRC Membership

Seven new members joined the Biotechnology Research Center in 2014 which include Aparna Deshpande, (Research Assistant Professor, Biological Sciences), Xuan Liu (Assistant Professor, Biomedical Engineering), Zhiying Shan (Assistant Professor, Kinesiology and Integrative Physiology), Ye Sun (Assistant Professor, MEEM), Marina Tanasova (Assistant Professor, Chemistry), Ebenezer Tumban (Assistant Professor, Biological Science) and Yordan Yordanov (Research Assistant Professor, School of Forest Resources and Environmental Science). MTU departments represented include Biological Sciences, Biomedical Engineering, Physics, Mechanical Engineering–Engineering Mechanics, School of Forest Resources and Environmental Sciences, Mathematics, Chemistry, Chemical Engineering, Kinesiology & Integrative Physiology, and Material Sciences and Engineering. The BRC currently has 49 faculty members including three department chairs and one associate dean. BRC member, Xuan Liu, left the university in academic year 2014. Several faculty members were honored with election/appointment to posts in national/international level science organizations. Our students were very successful at acquiring grants, fellowships and other honors based on their research productivity.

Current BRC Faculty Members

Susan Bagley  Professor Emeritus, Biological Sciences
Lanrong Bi  Associate Professor, Chemistry
Victor Busov  Professor, SFRES
Jason Carter  Department Chair, Associate Dean, Associate Professor, KIT
Qing-Hui Chen  Assistant Professor, KIT
Tarun Dam  Assistant Professor, Chemistry
Rupali Datta  Associate Professor, Biological Sciences
Aparna Deshpande  Research Assistant Professor, Biological Sciences
John Durocher  Assistant Professor Biological Sciences
Shiyue Fang  Associate Professor, Chemistry
Megan Frost  Associate Professor, Biomedical Engineering
Oliver Gailing  Associate Professor, SFRES
Jeremy Goldman  Associate Professor, Biomedical Engineering
Michael Gretz  Professor, Biological Sciences
Patricia Heiden  Professor, Chemistry
Caryn Heldt  Assistant Professor, Chemical Engineering
Jingfeng Jiang  Assistant Professor, Biomedical Engineering
Chandrashekhar Joshi  Department Chair, Biological Sciences; Professor, SFRES
Sean Kirkpatrick Chair and Professor, Biomedical Engineering
Bruce Lee Assistant Professor, Biomedical Engineering
Wenzhen Li Associate Professor, Chemical Engineering
Haiying Liu Professor, Chemistry
Lynn Mazzoleni Assistant Professor, Chemistry
Adrienne Minerick Associate Professor, Chemical Engineering
Pushpalatha Murthy Professor, Chemistry
Keat Ghee Ong BRC Director, Associate Professor, Biomedical Eng.
Ching-An Peng Professor/Mack Chair, Chemical Engineering Rupak
Rajachar Senior Lecturer, Biomedical Engineering
Paul Sanders Assistant Professor, Materials Science & Engineering
Qiuying Sha Associate Professor, Mathematical Sciences
Reza Shahbazian-Yassar Associate Professor, ME-EM
Zhiying Shan Assistant Professor, KIT
Tolou Shokuhfar Assistant Professor, ME-EM
David Shonnard Robbins Professor, Chemical Engineering
Ye Sun Assistant Professor, ME-EM
Marina Tanasova Assistant Professor, Chemistry
Guiliang Tang Associate Professor, Biological Sciences
Xiaqing Tang Assistant Professor, Biological Sciences
Martin Thompson Associate Professor, Chemistry
Ashutosh Tiwari Assistant Professor, Chemistry
Ebinezer Tumban Assistant Professor, Biological Science
Leah Vucetich Research Assistant Professor, SFRES
Hairong Wei Assistant Professor, SFRES
Thomas Werner Assistant Professor, Biological Sciences
Ramakrishna Wusirika Associate Professor, Biological Sciences
Yordan Yordanov Research Assistant Professor, SFRES
Yinan Yuan Research Assistant Professor, SFRES
Shuanglin Zhang Professor, Mathematical Sciences
Feng Zhao Assistant Professor, Biomedical Engineering
Wen Zhou Assistant Professor, Chemical Engineering

Research Scientists/ Associates

1. Dr. Bin Cao, Postdoctoral Researcher (Fang)
2. Dr. Madmumita Dash, Postdoctoral Researcher (Busov)
3. Dr. Xiaochu Ding, Postdoctoral Researcher (Lee)
4. Dr. Tatyana Georgieva, Postdoctoral Researcher (Busov)
5. Mingjun Gu, Research Associate (Chen)
6. Dr. Jagadeesh Jnananam, Postdoctoral Researcher (Tiwari)
7. Meng-Hsien Lin, Research Scientist (Lee)
8. Dr. Swati Puranik, Postdoctoral Research Scientist (Gailing/Joshi)
9. Dr. Giri K. Vegesna, Postdoctoral Researcher (Lee)
10. Dr. Qi Xing, Postdoctoral Researcher (Zhao)
11. Dr. Elena Yordanova Postdoctoral Researcher (Busov)
12. Dr. Yordan Yordanov, Research Assistant Professor (Busov)
13. Dr. Lijun Zhang, Postdoctoral Researcher (Zhao)
14. Ruhua Zhang, Visiting Scientist (Gailing)
15. Yu Zhao, Research Associate (Zhao)
Graduate Students

Biological Sciences

1. Faten Dhawi (Ph.D., Datta/Wusirika)
2. Kyle Driscoll (M.S., Deshpande/Wusirika)
3. Emily Geiger (Ph.D., Datta)
4. Morton Harwood (Ph.D., Durocher)
5. Andrew Kennedy (M.S., Datta)
6. Jeffrey Kiiskila (Ph.D., Datta)
7. Kavitha Kumar (Ph.D., Joshi)
8. Chelsea Mitchell (M.S., Werner)
9. Nafeesa Rahman (M.S., Deshpande/Wusirika)
10. Komal Kumar Bollepogu Raja (Ph.D., Werner)
11. Ramana Reddy (Ph.D., Datta)
12. Aparupa Sengupta (Ph.D., Datta)

Biomedical Engineering

13. Brett Barker (M.S., Jiang)
14. Weilue He (Ph.D., Frost)
15. Sean Hopkins (Ph.D., Frost)
16. Baratwaaj Kannan (M.S., Zhao)
17. Elizabeth Kruppe (M.S., Frost/Zhao)
18. Yuting Li (M.S., Lee)
19. Yuan Liu (Ph.D., Lee)
20. Connor McCarthy (Ph.D., Frost/Goldman)
21. Heo Meng (Ph.D., Lee)
22. Ameya Narkar (M.S., Lee)
23. Julie Osborne (M.S., Frost)
24. Rattapol Pinnaratip (Ph.D., Lee/Rajachar)
25. Zichen Qian (Ph.D., Zhao)
26. Emily Shearier (Ph.D., Zhao)
27. Kevin Sunderland (Ph.D., Jiang)
28. Yu Wang (Ph.D., Jiang)
29. Andrew DeRouin (Ph.D., Ong)
30. Sterling Prince (Ph.D., Ong)
31. Brandon Pereles (Ph.D., Ong)
32. Joseph Smith (M.S., Ong)

Chemical Engineering

33. Tayloria Adams (Ph.D., Minerick)
34. Zainab Alshoug (Ph.D., Minerick)
35. Ran An (Ph.D., Minerick)
36. Jeana Collins (Ph.D., Minerick)
37. Maria Gencoglu (Ph.D., Heldt)
38. Maryam Khaksari (Ph.D., Minerick)
39. Hwi Yong Lee (Ph.D., Minerick)
40. Ashish Saksule (Ph.D., Heldt)
41. K. Saagar Vijayaragavan (Ph.D., Heldt)
42. Zhichao Wang (Ph.D., Minerick)
43. Hongyu Xie (M.S., Minerick)
44. Chungja Yang (Ph.D., Minerick)

Chemistry

45. Rashmi Adhikari (Ph.D., Tiwari)
46. Soha Albukhari (Ph.D., Heiden)
47. Jiangheng Bi (Ph.D., Liu H)
48. Robert Brown (M.S., Dam)
49. Nethaniah Dorh (Ph.D., Tiwari)
50. Colina Dutta (Ph.D., Tiwari)
51. Ni Fan (Ph.D., Dam)
52. Suntara Fueangfung (Ph.D., Fang)
53. Bhaskar Halami (Ph.D., Liu H)
54. John Hausman (M.S., Tiwari)
55. Ashok Khanal (Ph.D., Fang)
56. Cong Li (M.S., Liu H)
57. Xi Lin (Ph.D., Fang)
58. Wafa Mazi (Ph.D., Liu H)
59. Andrew Perla (M.S., Tanasova)
60. Durga Pokharel (Ph.D., Fang)
61. Shahien Shahsavari (Ph.D., Fang)
62. Melanie Talaga (Ph.D., Dam)
63. Giri Vegesna (Ph.D., Liu H)
64. Xu Xiang (Ph.D., Heiden)
65. Fei Xie (Ph.D., Liu)
66. Mu Yang (Ph.D., Tiwari)
67. Jingtuo Zhang (Ph.D., Liu H)

Forest Resources and Environmental Sciences

68. Roba Bdeir (Ph.D., Gailing)
69. Kristina Flesher (M.S., Gailing)
70. Sirkorn Khumwan (Ph.D., Gailing)
71. Sudhir Khodwekar (Ph.D., Gailing)
72. Jennifer Lind (Ph.D., Gailing)
73. Sandra Owusu (Ph.D., Gailing)
74. Justin Segula (Ph.D., Busov)

Kinesiology & Integrative Physiology

75. Andrew Chapp (Ph.D., Chen)
76. Ida Fonkoue (Ph.D., Carter)
77. Michael Huber (M.S., Chen)
78. Robert Larson (Ph.D., Chen)

Mathematical Sciences

79. Xueling Li (M.S., Sha)
80. Xiaoyu Liang (Ph.D., Zhang)
81. Zhenchuan Wang (Ph.D., Zhang)
82. Xinlan Yang (Ph.D., Sha)
83. Huanhuan Zhu (Ph.D., Sha)

**Mechanical Engineering**
84. Dave Joda (M.S., Jiang)

**Undergraduate Students**

1. Jonathon Anderson, Chemical Engineering (Lee)
2. Evan Bachman, Biological Sciences (Werner)
3. Carl Baker, Chemical Engineering (Minerick)
4. Cedrick Barber, Chemical Engineering (Minerick)
5. Alexander Benson, Biomedical Engineering (Frost)
6. Ryan Bensen, Biological Sciences (Werner)
7. Michael Bostwick, Biomedical Engineering (Lee)
8. Bruce Bunson, Biomedical Engineering (Frost)
9. Morgan Cencer, Chemistry (Lee)
10. Emily Collins, Forest Resources & Environmental Sciences (Gailing)
11. Michael D’Angelo, Chemical Engineering (Heldt)
12. Abby DeWitt, Kinesiology & Integrative Physiology (Carter)
13. Ryan Dixon, Biological Sciences (Durocher)
14. Luke Doskey, Chemistry (Dam)
15. Zach Eckert, Chemical Engineering (Minerick)
16. Corey Ernst, Biomedical Engineering (Lee)
17. Corey Fase, Biomedical Engineering (Zhao)
18. Madeline Faust, Biomedical Engineering (Lee)
19. Joseph Feddie, Chemistry (Heiden)
20. Kemin Fena, Biomedical Engineering (Zhao)
21. Evan Fernandez, Biological Sciences (Wusirika)
22. Kailey Feuerstein, Biological Sciences (Datta)
23. Kristin Flickinger, Biomedical Engineering (Jiang)
24. Amani Gillete, Biomedical Engineering (Goldman)
25. Kate Gladowski, Kinesiology & Integrative Physiology (Carter)
26. Nathanael Green, Chemistry (Fang/Yuan)
27. Ian Greenlund, Biological Sciences (Werner)
28. Michael Grillo, Chemical Engineering (Heldt)
29. Roger Guillory, Biomedical Engineering (Goldman)
30. Taija Hahka, Biological Sciences (Datta)
31. Sarah Harttung, Forest Resources & Environmental Sciences (Gailing)
32. Rebecca Hobmeyer, Biological Sciences (Werner)
33. Rachael Huempfner, Environmental Engineering (Datta)
34. Olivia Ingram, Biological Sciences (Werner)
35. Jonathan Jaehning, Scientific and Technical Communication (Frost)
36. Kyle Jansen, Biomedical Engineering (Zhao)
37. Tyler Jensen, Chemical Engineering (Heldt)
38. Emil Johnson, Biomedical Engineering (Zhao)
39. Nick Jones, Biomedical Engineering (Jiang)
40. Mark Keranen, Biological Sciences (Werner)
41. Thomas Kivisto, Biomedical Engineering (Jiang)
42. Benjamin Klimczyk, Biological Sciences (Datta)
43. Shari Konst, Chemistry (Lee)
44. Joseph Kristofik, Biomedical Engineering (Jiang)
45. Lucia Li, Chemical Engineering (Fang)
46. Sean LeRolland-Wagner, Chemistry (Fang)
47. Laura Lynch, Biomedical Engineering (Goldman)
48. Kelsey Maijala, Chemical Engineering (Minerick)
49. Hannah Marti, Biomedical Engineering (Durocher)
50. Katherine Massa, Chemical Engineering (Minerick)
51. Abigail Meisel, Biological Sciences (Werner)
52. Ross Michales, Biomedical Engineering (Jiang)
53. Meridith Murley, Biomedical Engineering (Lee)
54. Eliot Nagler, Chemical Engineering (Minerick)
55. Abigail Nieskes, Biomedical Engineering (Jiang)
56. Peter Nouhan, Biological Sciences (Werner)
57. Austin O'Dea, Chemistry (Tanasova)
58. Connor Olds, Chemistry (Liu H)
59. Nina Pacella, Biomedical Engineering (Ong)
60. Amber Peabody, Biological Sciences (Werner)
61. Eric Pearson, Chemical Engineering (Heldt)
62. Jared Pecore, Biological Sciences (Chen)
63. Amber Ranski, Biological Sciences (Datta)
64. Bridgett Rebbeck, Biological Sciences (Werner)
65. Travis Redman, Biomedical Engineering (Zhao)
66. Cal Rittual, Biomedical Engineering (Jiang)
67. David Rosen, Biomedical Engineering/Kinesiology & Integrative Physiology (Jiang)
68. David Schreifels, Cognitive & Learning Sciences (Chen)
69. Ashley Schuman, Chemistry (Fang)
70. Alyssa Sipes, Biological Sciences (Datta)
71. Sarah Skelton, Biomedical Engineering (Lee)
72. Hugh Stanton, Biomedical Engineering (Zhao)
73. Rachel Stites, Biomedical Engineering (Zhao)
74. Mitchell Tahtinen, Biomedical Engineering (Zhao)
75. Caleb Vogt, Biomedical Engineering (Zhao)
76. Travis Wakeham, Biological Sciences (Datta/Durocher)
77. Anna Waller, Biomedical Engineering (Goldman)
78. Randall Wilharm, Chemistry (Lee)
79. Anna-Catharina Wilhelm, Chemistry (Fang/Lee)
80. Audra Winter, Chemistry (Lee)
81. Pennie Winters, Chemical Engineering (Minerick/Heldt)
82. Randee Wlodek, Biological Sciences (Datta)
83. Keegan Yates, Biomedical Engineering (Zhao)
84. Eponine Zenker, Chemistry (Tiwari)
85. Carson Zois, Biological Sciences (Jiang)
BRC Faculty Members Special Honors

**John Durocher:** Certificate of Appreciation of Outstanding Contributions as a Faculty Member, Greek Life at Michigan Tech

**Qiuying Sha:**
- Outstanding Teaching Award 2014, Department of Mathematical Sciences at Michigan Technological University
- Outstanding Faculty Research Award 2014, Department of Mathematical Sciences at Michigan Technological University

**Jason Carter:**
- President, Michigan Physiological Society (4/14 – 4/15)
- Board of Directors, American Kinesiology Association (1/12 – 12/14)
- Cross-Sectional Symposium Chair for Experimental Biology 2014 (San Diego, CA)

**Outreach/ Summer Internships (15)**

1. **Anaflavia Alemendras-Reyes**, Grand Rapids Community College (Zhao)
2. **Umang Arora**, Indian Institute of Technology at Kanpur, India (Heiden)
3. **Rolando Bacanegra**, MUCP, Grand Rapids Community College (Heldt)
4. **Binu Baral**, MUCP, Grand Rapids Community College (Heldt)
5. **Vagarshak Begoyan**, University of California-Davis (Tanasova)
6. **Phoebe Hu**, Houghton High School (Frost)
7. **Pursu Neopaney**, Grand Rapids Community College (Zhao)
8. **Hien Nguyen**, MUCP, Grand Rapids Community College (Minerick)
9. **Tracy Ross**, MUCP, Wayne County Community College (Lee)
10. **Tapee Saowalakkul**, Kasetsart University, Thailand (Heldt)
11. **Anne Shoos**, University of Michigan (Frost)
12. **Matt Strong**, Finlandia University (Fang)
13. **SyQuan Tran**, Grand Rapids Community College (Zhao)
14. **Chinyelu Umeokolo**, Wayne County Community College (Fang)
15. **Dr. A. Venu Vinod**, Visiting Professor (Minerick); Assoc. Prof/Assoc. Dean, Nat’l Institute of Technology, India

**SURF Awards**

**Kristin Flickinger** (Biomedical Engineering), Advisor: Jingfeng Jiang

**Sarah Harttung** (Forest Resources & Environmental Sciences), Advisor: Oliver Gailing

**Peter Gardner** (Chemical Engineering), Advisor: Heldt

**Mark Keranen** (Biological Sciences), Advisor: Thomas Werner

**Meridith Murley** (Biomedical Engineering), Advisor: Bruce Lee

**David Rosen** (Biomedical Engineering/Kinesiology & Integrative Physiology), Advisor: J. Jiang

**Eponine Zenker** (Chemistry), Advisor: Ashutosh Tiwari
Student Honors Received

**Jonathon Anderson:** Third Place in MTU Undergraduate Research Expo

**Michael Bostwick:** Undergraduate Merit Award at MTU BRC Student Research Forum

**Morgan Cencer:** Second Place in MTU Undergraduate Research Expo

**Andrew Chapp:** Selected Oral Presentation Award at 1st Annual Meeting of Michigan Physiology Society

**Jeana Dillon:** First Place in Chemical Engineering Research Symposia at MTU

**Nethaniah Dorh:** FASEB MARC Travel Award for Annual Symposium of the Protein Society

**Suntara Fueangfung:** First Place for poster presentation at ACS Upper Peninsula Student Research Symposium at NMU, Spring Semester Graduate School Doctoral Finishing Fellowship

**Maria Gencoglu:** First Place in Chemical Engineering Research Symposia at MTU

**Nathanael Green:** Undergraduate Award in Organic Chemistry by ACS's Division of Organic Chemistry

**Maryam Khaksari:** Society of applied Spectroscopy (SAS) Early Career Researcher Award

**Maryam Khaksari:** Highest award at Graduate Research Colloquium at MTU

**Ashok Khanal:** First Place for poster presentation at ACS Upper Peninsula Student Research Symposium at NMU

**Robert Larson:** Research Recognition Van Harreveld Award at Experimental Biology Annual Meeting, APS, CNS Section

**Yuting Li:** Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship

**Ameya Narkar:** Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship

**Durga Pokharel:** MTU Bhakta Rath Research Award, Department of Chemistry Outstanding Graduate Student Award

**Mitchell Tahtinen:** Kenneth L. Stevenson Biomedical Engineering Summer Research Fellowship

**Melanie Talaga:** First Place for poster at American Chemical Society Regional Meeting

**Dylan Turpinen:** Gary and Judy Anderson Fellowship

**K. Saagar Vijayaragavan:** Graduate Government Service Award

**Anna-Catharina Wilhelm:** Sandretto Undergraduate Summer Research Fellowship

BRC Student Support/ Sponsored Activities

The BRC continued to offer research opportunities and financial support to our graduate and undergraduate students through its various initiatives in 2014. The BRC encourages its members to mentor both graduate and undergraduate students who are interested in the research being conducted at the Center. BRC faculty members mentor undergraduate students and continue to volunteer for outreach activities and Summer Youth Programs. 81 graduate students, 15 postdoctoral researchers/research scientists and 83 undergraduate students have the opportunity for to apply for support through its travel awards, fellowships and cash awards and prizes for outstanding presentations at our annual biotech research forum.
BRC Research Forum

The Tenth Annual Student Research Forum sponsored by the Biotechnology Research Center and the Ecosystem Science Center was held on March 19, 2014. Sixty-nine students at both the graduate and undergraduate levels submitted abstracts and posters. Due to the growth in popularity and participation, the BRC and ESC directors decided that it was time for each center to hold its own forum. The BRC chose to hold theirs in the fall; therefore, on October 22 & 23, 2014, the BRC held its Eleventh BRC Research Forum. Forty-one graduate and undergraduate students conducting research in life science, biotechnology, human health, and related areas presented posters. Oral presentations were also given. Speakers included: Dr. Jeremy Goldman (Biomed), Dr. Ashutosh Tiwari (Chemistry), Dr. Hairong Wei (SFRES), Justin Segula (SFRES Graduate Student), Jingtuo Zhang (Chemistry Graduate Student) and Caleb Vogt (Biomed Undergrad Student).

2014 BRC Research Forum Award Recipients

Graduate Student Awards

Grand Prizes
Spring: Connor McCarthy (Biomed, Frost/Goldman)
Fall: Maria Gencoglu (Chem Engg, C Heldt)

Merit Awards
Spring: Yiping Mao (Biology, X Tang)
Mu Yang (Chemistry, Tiwari)
Fall: Emily Shearier (Biomed, F Zhao)
Yu Yang (Biomed, J Jiang)

Undergraduate Student Awards

Grand Prizes
Spring: Keegan Yates (Biomed, Zhao)
Fall: Caleb Vogt (Biomed, Frost/Zhao)

Merit Award:
Spring: Michael Bostwick (Biomed, Lee)
BRC Travel Grants

In the spring of 2005, the Biotechnology Research Center began offering travel grants to MTU graduate and undergraduate students and post-doctoral research scientists who present biotechnology related research at national or international conferences. Grants are awarded in the spring and fall each year. Twenty-three applications were submitted in 2014 with eighteen grants awarded totaling $5,550. Students from Biological Sciences, Biomedical Engineering, Chemistry, Chemical Engineering, KIT, Math, Cognitive & Learning Sciences, Materials Science and Engineering and SFRES participated. Since 2005, $83,548 has been awarded as BRC Travel Grants.

**Spring 2014 Travel Award Recipients**

Andrew Chapp ($200) Experimental Biology 2014 Conference  
Colina Dutta ($200) 27th Annual Symposium of the Protein Society  
Ida Fonkoue ($250) Experimental Biology 2014 Conference  
Jagadeesh Janjanam ($250) 27th Annual Symposium of the Protein Society  
Robert Larson ($300) Experimental Biology 2014 Conference  
K. Saagar Vijayaragavan ($300) American Chemical Society Meeting  
Chungja Yang ($400) International Conference on Multiphase Flow 2013

**Fall 2014 Travel Award Recipients**

Faten Dhawi Almuhanna ($250) International Plant and Animal Genome XXII Meeting  
Ran An ($250) SciX 2013 Conference  
Margaret Brunette ($200) Biomedical Engineering Society Annual Conference  
Morgan Cencer ($250) American Chemical Society Fall National Conference  
David Chadderdon ($300) 2013 AIChE Annual Conference  
Kristina Flesher ($300) International Annual Meetings of ASA, CSSA, and SSSA  
Azhang Hamlekham ($250) TMS 2014 Annual Meeting & Exhibition  
Hal Holmes ($250) Biomedical Engineering Society Annual Conference  
Sean Hopkins ($250) 246th American Chemical Society National Meeting  
Maryam Khaksari ($200) SciX 2013 Conference  
Connor McCarthy ($300) 246th American Chemical Society National Meeting  
Ramkumar Mohan ($200) The Midwest Islet Club Meeting  
Ji Qi ($250) 2013 AIChE Annual Conference  
Aparupa Sengupta ($300) Society for Industrial Microbiology and Biotechnology  
Emily Shearier ($200) TERMIS-AM 2013 Conference and Exposition  
Maria Tafur ($300) 2013 AIChE Annual Conference  
Le Xin ($300) AIChE 2013 Annual Meeting  
Mimi Yang ($250) 246th American Chemical Society National Meeting  
Keegan Yates ($250) Biomedical Engineering Society National Meeting  
Lijun Zhang ($300) MSC 2013 Adult Stem Cell Therapy & Regenerative Medicine Meeting
PhD Finishing Fellowships

In 2008 the BRC established a PhD finishing fellowship to provide partial financial support to PhD students in the final year of their program and who are no longer receiving other financial support. To qualify, applicants must have been supported by BRC affiliated external research grants for at least three years, and they must be in the final year of their PhD program. Fellowships are awarded on an as-needed basis.

BRC Invited Speaker Seminars

The BRC seminar series, begun in 2006, has helped support at least 30 speakers invited to the University. Unfortunately, in 2014, weather prevented two guest speakers from arriving. 2014 seminars include:

Dr. Kyung-Hwan Han; Michigan State University; September, 2013.

Dr. Kelly Dyer; University of Georgia; September, 2014.

Dr. Wan-ju Li; University of Wisconsin at Madison; October, 2014.

Dr. Kevin Heffernan; Syracuse University; October, 2014.

BRC Finishing Fellowships Awarded in 2014

Connor McCarthy - $5,000; Summer, 2014 (Biomed, Goldman/Frost)

Venkataramana Pidatala - $2,500; Summer 2014 (Biology, Datta)

Maria Tafur - $2,500; Fall, 2014 (Chem Engg, Heldt)
FY14 Infrastructure Improvement Grants

Maintaining and upgrading the biotechnology research facilities is vital to the continued success of the BRC and remains a priority of members of the Center. The sharing of equipment and facilities by the Center's researchers is economically and strategically prudent. State-of-the-art equipment and facilities also help attract faculty, graduate students and research scientists to Michigan Tech.

The BRC members voted to continue this initiative resulting in the fifth round of funding (FY15 & FY16). These awards have supported research infrastructure improvements at MTU since 2006. Over $13,500 was awarded to support purchasing equipment valued at more than $182,400 in FY14.

The infrastructure improvement grant guidelines, established in FY06, require a 100% match from other funding sources. These grants are open to all departments represented by the members in the center, and have been primarily used by junior faculty as a supplement to start-up funding. Requests for awards are accepted throughout the two year cycle with the three groups receiving equal amounts each cycle.

<table>
<thead>
<tr>
<th>Grant</th>
<th>Total Value</th>
<th>BRC Match</th>
<th>Department</th>
<th>Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber-optic Fusion Splicer</td>
<td>$12,060</td>
<td>$2,502</td>
<td>Biomed</td>
<td>X Liu</td>
</tr>
<tr>
<td>Enhancement for Electron Microscope</td>
<td>$70,810</td>
<td>$2,000</td>
<td>COE/CSA</td>
<td>B Lee/ Heiden/ Mazzoleni/ S-Yassar</td>
</tr>
<tr>
<td>Reinstallation of ICP-MS</td>
<td>$30,350</td>
<td>$6,925</td>
<td>CSA</td>
<td>Datta/ Gretz</td>
</tr>
<tr>
<td>Equipment for Cell Culture &amp; Bio-Imaging Core Facility</td>
<td>$69,000</td>
<td>$2,000</td>
<td>CSA</td>
<td>Carter/ Bi</td>
</tr>
<tr>
<td>Eppendorf Pipette</td>
<td>$265</td>
<td>$137.50</td>
<td>SFRES</td>
<td>Gailing</td>
</tr>
</tbody>
</table>
Begun in 2011, the BRC Research Initiative provides PIs access to additional funding which helps to support various research projects and assistance with graduate education in biotechnology.

<table>
<thead>
<tr>
<th>BRC Member</th>
<th>Research Initiative Funds Used Toward:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shiyue Fang</td>
<td>- Purchase of chemicals for research projects</td>
</tr>
<tr>
<td></td>
<td>- Support of a post-doc</td>
</tr>
<tr>
<td>Megan Frost</td>
<td>- Support of student research and wages</td>
</tr>
<tr>
<td>Oliver Gailing</td>
<td>- Support for graduate students who were funded by external scholarships</td>
</tr>
<tr>
<td></td>
<td>- Gathered preliminary data used for NSF submission</td>
</tr>
<tr>
<td>Jeremy Goldman</td>
<td>- Research projects on bioabsorbable stents: resulted this year in 3 papers accepted, 2 papers in revision, and one paper in preparation</td>
</tr>
<tr>
<td>Caryn Heldt</td>
<td>- Gathered preliminary data for future grants. Three proposals will be submitted soon based on the preliminary data gathered from funds from BRC Research Initiative (one to NIH on a malaria biosensor, one to NSF on a graphene biosensor and one to the Army on a flexible biosensor)</td>
</tr>
<tr>
<td></td>
<td>- Purchased a sonicator and repaired centrifuge</td>
</tr>
<tr>
<td>Jingfeng Jiang</td>
<td>- Repair of power supply of Bose Electroforce Mechanical Testing machine</td>
</tr>
<tr>
<td></td>
<td>- Partial support of Yu Wang (PhD student) and Dave Rosen (MS student, starting January, 2015) to attend IEEE ultrasonic symposium, Chicago, 2014</td>
</tr>
<tr>
<td>CP Joshi</td>
<td>- Used for travel to conferences</td>
</tr>
<tr>
<td>Bruce Lee</td>
<td>- Purchase of replacement battery for laptop</td>
</tr>
<tr>
<td>Adrienne Minerick</td>
<td>- Travel for Minerick</td>
</tr>
<tr>
<td></td>
<td>- Intermittent graduate student support for Hwi Yong Lee, Zhichao Wang, Chungja Yang and Ran An</td>
</tr>
<tr>
<td></td>
<td>- Publishing fees</td>
</tr>
<tr>
<td>Yinan Yuan</td>
<td>- Two week salary for Yuan (with permission from MTU and SFRES)</td>
</tr>
<tr>
<td>Feng Zhao</td>
<td>- Purchase of lab supplies</td>
</tr>
</tbody>
</table>
The Biotechnology Research Center continues its tradition of excellence in research, student training and outreach for the benefit of society and the environment with over $12.3 million in 55 research grants and contracts, with the major portion coming from the primary national funding agencies.

In FY2014:
- Total research funding: $12,349,246
- Active Research Projects: 49
- New awards: 26 totaling $4,658,240
- Total Research Expenditures: $2,117,627

**FY14 IRAD Report**

The Biotechnology Research Center had a slight decrease in revenue (IRAD) generated through external research grants in 2014. The IRAD received fund the various BRC initiatives which were established to enhance research efforts of members, their students and research assistants. In special cases, an IRAD waiver may be provided to a BRC member to ease financial constraints of a proposal. The BRC continues to keep its operational budget to a minimum so that the majority of funds generated by the BRC members will help them reach their research goals. In FY14, BRC affiliated projects generated $543,888 in IRAD.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total BRC Generated IRAD</th>
<th>20% Returned to BRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td>$76,544</td>
<td>$15,309</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>$156,152</td>
<td>$31,230</td>
</tr>
<tr>
<td>Chemistry</td>
<td>$30,565</td>
<td>$6,113</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>$53,230</td>
<td>$10,646</td>
</tr>
<tr>
<td>Electrical &amp; Computer Engg</td>
<td>$4,669</td>
<td>$934</td>
</tr>
<tr>
<td>Mathematics</td>
<td>$23,714</td>
<td>$4,743</td>
</tr>
<tr>
<td>ME-EM</td>
<td>$11</td>
<td>$2</td>
</tr>
<tr>
<td>SFRES</td>
<td>$199,003</td>
<td>$39,801</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>$543,888</strong></td>
<td><strong>$108,778</strong></td>
</tr>
</tbody>
</table>
### Table: Distribution of BRC IRAD Returns by the Colleges and Schools in FY 14:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total BRC Generated IRAD</th>
<th>20% Returned to BRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Engineering</td>
<td>$214,062</td>
<td>$42,813</td>
</tr>
<tr>
<td>College of Sciences &amp; Arts</td>
<td>$130,823</td>
<td>$26,164</td>
</tr>
<tr>
<td>SFRES</td>
<td>$199,003</td>
<td>$39,801</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$543,888</strong></td>
<td><strong>$108,778</strong></td>
</tr>
</tbody>
</table>

### BRC Affiliated Active Grants

**Fang**
$260,000; 08/11 – 07/15
Purification Synthesis Peptides Using a Catching by Polymerization Approach

**Fang, Shahbazian-Yassar, Yuan**
$200,000; 05/12 – 04/15
I1DBR (EAGER):  An AFM-Based Instrument for Monitoring DNA Synthesis in Real-Time

**Frost**
$450,000; 08/14 – 07/17
Tunable Nitric Oxide Release Materials

**Heldt**
$174,175; 08/11 – 07/14
BRIDGE:  Chitosan Electrospun Membrane for Pathogen Removal

**Heldt**
$274,736; 06/12 – 09/15
Precipitation and Self-Interaction of Viruses by Preferential Hydration

**Minerick**
$100,000; 09/12 – 08/13
Nano and Microprinting Equipment for Novel Bioparticle Separations

**Minerick, Raber, Bergstrom**
$200,000; 5/14 – 11/15
PFI: AIR – TT:  Blood Typing Device without Reagents: Sensing Electrodes to Replace Optics

**Minerick**
$50,000; 04/13 – 09/13
I-Corps:  ABO-Rh Blood Type Identification Using Dielectrophoretic Microdevice

**Tang, G, Wei**
$2,499,979; 06/14 – 05/17
Targeting MicroRNAs for Destruction in Crops by Short Tandem Target Mimic (STTM)

**Tang, G**
$251,592; 11/11 – 07/14
EAGER:  RNAi Gene Discovery Tool to Randomly Generate Dominant Mutant Pools in Plants
Bi
$202,263; 08/09 – 07/14
Enhancing the “Barcode” Readability of Color-Labeled Molecular Tags by Linker Engineering to Facilitate Genetic Analysis

Carter
$465,000; 09/14 – 08/17
Sleep Deprivation in Women

Chen
$458,920; 12/14 – 11/17
ER Stress and Reduced SK Channel Function in PVN in Rats with High Salt Intake

Goldman, Frost
$459,600; 05/12 - 04/15
Therapeutic Lymphatic Collecting Vessel Regeneration by Directed Fluid Flow

Goldman
$42,684; 08/13 – 06/16
Small Diameter Blood Vessel

Fang
$333,631; 02/14 – 01/17
Oligodeoxynucleotide Synthesis Using Protecting Groups and a Linker Cleavable Under Neutral Oxidative Conditions

Frost
$86,212; 05/12 – 04/15
Lymphatic Regeneration

Jiang, Kirkpatrick, Rajachar
$450,000; 09/14 – 08/16
Virtual Breast Project: Improving Non-invasive Differentiation of Breast Tumors

Lee
$344,459; 03/13 – 02/16
Biomimetic Tissue Adhesive with Mechanically Tough Hydrogel Support

Rajachar, Ong
$168,774; 08/12 – 07/14
Novel Nano-Mechanical Platform to Investigate Therapeutic Sub-Cellular Mechanical Stimulation

Sha,Zhang
$156,000; 05/12 - 03/14
Statistical Methods for Family-based Association Studies

Zhao
$450,502; 07/13 – 06/16
Development of Off-the-shelf Completely Biological Small-diameter Blood Vessel with Human Stem Cells
Busov, Wei, Lilleskov, Yordanov
$900,000; 08/09-08/14
USDA Feedstock Genomics: A systems biology approach for elucidation the regulation poplar root system

Busov
$7,000; 10/14 - 09/15
McIntire Stennis: Regulation of Biomass Growth in Trees

Busov, Yordanov, Gailing
$499,916; 05/12 – 04/15
USDA NIFA: Plant Growth and Development Program: Role of Lateral Organ Boundary transcription factors in regulation of wood formation in poplar

Deshpande, Wusirika
$150,000; 02/14-01/16
Bioactive Components in Rice Callus Culture and Blueberry Extract as Anti-inflammatory Agents of the Gastrointestinal Tract

Gailing
$7,000; 10/14 – 09/15
McIntire Stennis: Identification of Genes Involved in the Maintenance of Species Identity in North American Red Oaks

Joshi
$7,000; 10/12 – 09/13
McIntire Stennis: Reengineering of Wood Cellulose Synthesis for Better Bioenergy Production

Wei
$7,000; 10/14 - 09/15
McIntire Stennis: Genetics Manipulation of the Genes Controlling Tree Growth

Yuan, Wei
$149,888; 04/12 – 04/15
Systemic Identification and Characterization of Overlapping Sense/Antisense Gene Loci in Populus Genome

Busov, Yordanov, Tuskan, Wellington and Sykes
$1,100,000; 8/12 – 7/15
DOE Feedstock Genomics: Gene discovery. Functional discovery and characterization of genes and alleles affecting wood biomass yield and quality in poplar using activation tagging and association analysis

Joshi
$224,000 (total funding about $1.1 million); 09/08 – 07/13
EU-US Transatlantic Masters degree program in Forest Resources (EU-USTMDPFR) Other collaborator Universities include North Carolina State University, NC (PI: Bronson Bullock); University of Helsinki, Finland (PI: Outi Orenius) and Swedish Agricultural University, Sweden (PI: Vilis Brukas)
The Gerber Foundation

Minerick
$219,728; 06/12 – 07/15
Rapid Nutritional Analysis from Infant Tears

Michigan Space Grant Consortium

Heldt
$10,000; 05/12 -12/13
Research Seed Grant: Graphene-based Biosensor for Protein Detection

American Physiological Society

Ross, Carter
$5,000; 01/13 – 02/14
Sleep Efficiency and Neural Cardiovascular Control in Humans
(Faculty mentor for undergraduate student fellowship)

Huron Mountain Foundation

Gailing
$3,000; 02/13 – 01/14
Genetic Structure of Pre-European Settlement Quercus rubra Forests II

Werner
$2,000; 05/14 – 04/15
The Lepidoptera and Drosophilidae of the Huron Mountains

MichiganTech

Carter
$61,000; 07/14 – 08/15
Bio Imaging Core Facility

Durocher
$31,600; 07/13 – 08/15
REF seed grant: The Effect of Diet or Exercise on Visceral Obesity, Neural Cardiovascular Reactivity and Arterial Stiffness in Obese Humans

Fang
$19,000; 07/14 – 08/15
Commercialize Technologies for Biopolymer Purification

Tanasova
$61,000; 07/14 – 08/15
Cell Culture and Bioimaging Core Facility

Tiwari
$24,560; 07/14 – 08/15
Understanding the Role of Protein Aggregation in Cellular Toxicity

Werner
$27,000; 07/12 – 08/14
Evolution of Mushroom Toxin

Werner
$6,100; 07/12 – 08/13
REF Mentor Grant: Evolutionary Ecology

Yuan
$15,000; 07/14 – 08/15
Genome-wide Analysis of Regulatory RNAs Associated with Wood Formation in Populus
REF Mentor Grant: Evolutionary Ecology
North Carolina State University

Wei
$50,758; 02/13 – 05/15
Construction of Gene Regulatory Networks of Wood Formation in Poplar

Portage Health Foundation & Superior Ideas Crowd Fund

Carter, Smoot
$25,000; 01/13 – 02/14
Sleep Apnea and Neurovascular Control in Humans

Penn State

Gailing
$215,077; 04/11 – 06/15
TRPGR: Comparative Genomics of Environmental Stress Responses in North American Hardwoods

SIROM Scientific Solutions LLC

Datta
$77,000; 05/11 – 04/14
A Novel Phytoremediation Method Using Vetiver Grass to Cleanup Lead-Based Paint Contaminated Soils

Southern Illinois University - Carbondale

Datta
$95,094; 09/12 – 08/14
Low-Cost Green Technology to Improve Water Quality in Mining-Impacted Ecosystems

The University of Chicago (passthrough Merck)

Carter
$50,631; 04/14 – 12/15
Multi-Level Assessment of Physiologic Hyper-Arousal in Chronic Primary Insomnia: A Case Control Study

University of Michigan (MIIE)

Jiang, Wang, Bharti
$44,500; 07/14 – 06/15
Translation of Automated Flow Analysis into Clinical Workflow

University of Wisconsin Madison - NIH

Jiang
$15,250; 07/13 – 06/14
Real-Time Ultrasonic Monitoring of Tumor Ablation
Virginia Polytechnic Institute & State University

Murthy
$50,146; 04/11 – 03/15
Collaborative Research: Functional Characterization of Diphospho and Tripho-inositol Phosphates in Plants

Peer-reviewed Publications in 2014
(Bold = BRC Faculty)


