MU Enrollment

- Total Enrollment in Fall 2015 . . . . . . . . . . . . . . . . . . . . 35,448
- Total Enrollment in Fall 2016 . . . . . . . . . . . . . . . . . . . . 33,266
  > Sixth highest enrollment in University history
- MU’s retention rate climbed to 85.7%, the third highest in history.
Mizzou is among the top 2% of U.S. Universities.

Based on quality of teaching, research, & scholarship, MU is one of only 60 public and private universities invited to membership in AAU*. 

*AAU – Association of American Universities.
Technology Management

MU’s Office of Technology Management and Industry Relations (OTMIR) works to create value for tomorrow by helping faculty to identify, assess, protect and market commercially viable intellectual property developed at the University.
Licensing Income from MU Inventions

Active Options/Licenses

<table>
<thead>
<tr>
<th>Year</th>
<th>Licensing Income</th>
<th>Active Options/Licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>$43,379,974</td>
<td>226</td>
</tr>
<tr>
<td>2014</td>
<td>$10,244,453</td>
<td>219</td>
</tr>
<tr>
<td>2013</td>
<td>$7,370,182</td>
<td>202</td>
</tr>
<tr>
<td>2012</td>
<td>$6,331,295</td>
<td>183</td>
</tr>
<tr>
<td>2011</td>
<td>$7,375,777</td>
<td>168</td>
</tr>
</tbody>
</table>
FY 2015

**New Invention Disclosures**

<table>
<thead>
<tr>
<th>Year</th>
<th>Disclosures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>71</td>
</tr>
<tr>
<td>2014</td>
<td>85</td>
</tr>
<tr>
<td>2013</td>
<td>82</td>
</tr>
<tr>
<td>2012</td>
<td>93</td>
</tr>
<tr>
<td>2011</td>
<td>69</td>
</tr>
</tbody>
</table>

**Applications Filed/Patents Issued**

<table>
<thead>
<tr>
<th>Year</th>
<th>Filed</th>
<th>Patents Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>73</td>
<td>25</td>
</tr>
<tr>
<td>2014</td>
<td>107</td>
<td>36</td>
</tr>
<tr>
<td>2013</td>
<td>97</td>
<td>24</td>
</tr>
<tr>
<td>2012</td>
<td>91</td>
<td>19</td>
</tr>
<tr>
<td>2011</td>
<td>80</td>
<td>16</td>
</tr>
</tbody>
</table>
## Growth Percentage

University of Missouri

<table>
<thead>
<tr>
<th>Inventions</th>
<th>Licenses</th>
<th>Revenue</th>
<th>New Patent Apps</th>
<th>Startups</th>
<th>Issued US Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.) 107%</td>
<td>3.) 380%</td>
<td>14.) 162%</td>
<td>12.) 128%</td>
<td>2.) 1125%</td>
<td>9.) 106%</td>
</tr>
</tbody>
</table>
Technology Commercialization at MU

TOP FIVE FACTS:

1. University of Missouri System national ranking for total gross licensing income: **top 25**
2. UM licensing revenue generated by Mizzou: **94.8%**
3. MU licensing income, FY2012-16: **$46.3 million**
4. U.S. patents filed by MU, FY2012-16: **447**
5. Percentage of U.S. patents in MU’s portfolio that are commercialized: **35%**

*Ranking based on Association of University Technology Managers FY2014 survey data, the most recent available.*
Technology Commercialization at MU

**FINE PRINT**

MU Professor Sabo-Irurgia and his research team developed 3D bioprinting. Their technology, licensed by Organovo, uses bioprinted living tissue in real-time applications in technology, personalized drug testing and regenerative medicine. Organovo is listed on NASDAQ. The company had $104 million in revenue in 2020.

**REASON TO SMILE**

MU engineering Professor Lan Li and Georgiou, Jr. first applied carbon composite technology in the fields of dentistry and orthopaedics to develop products with improved strength and biological properties. Their technology, licensed by NanoMaterials, Inc., has received over $7 million in venture capital investments. NanoMaterials is developing a dental biomaterials tool for non-dental applications.

**PIPING UP SPEED**

Mu researches Brian Thompson and George Stewart discovered a bacterial production system that produces enhanced enzymes, proteins, and metabolites. This discovery is the foundation of Biomeris. The enzyme technology, which allows enzymes used in food processing and manufacturing to operate more quickly under higher temperatures and last longer in harsh environments, is in use by companies such as P-Bio and Baja. Crops were a focus in the research on crop production and Biomeris.

**KEEPING IT COOL**

ThermoVent Technologies offers cooling solutions to help satellites and other equipment work more efficiently. The firm uses carbon nanotube paste developed by MU engineering Professor Li. Its technologies include more cooling in less space than current systems and can be customized for microprocessors. ThermoVent also offers carbon nanotube-based electronics for refrigeration, design and engineering solutions.

**MAKING ENDS MEAT**

MU researchers developed a technology for using custom meat and meat products in meatless and plant-based foods. Their technology, licensed to Modern Meadow, a New York-based company that is using the latest advances in biotechnology, materials science and engineering to produce bioprinted-leather. In June 2020, the company announced $47 million in second-round financing, bringing the total raised to $100 million.

**A BURNING QUESTION**

Many healthcare software firms, such as Zydus, a medicine that combines a proton-pump inhibitor and a proton-pump inhibitor with an anti-ulcer, together with a broad range of costs and other conditions. Thanks to the work of MU researchers, Zydus does not require an acid-resistant coating, which makes it available in liquid form for those with swallowing difficulties. Since MU licensed the technology to Zydus, the company has raised over $5 million in one year.

**VITAL SIGNS**

MU researchers Marilyn Davis and Maria Santos are using a series of fluid bubbles to monitor and measure tissue. Their technology, licensed by ThermoAve, uses wireless sensors to detect early signs of brain and functional decline. ThermoAve is now working with San Juan Medical to develop new technology that could find its way into the smart home.

**HOW REJUVENATING**

MU scientists discovered that gold nanoparticles affect the life and stability of collagen. ThermoVent, a company that is developing collagen-based products for applications in nanotechnology, is based in Columbia and Missouri. ThermoVent has secured $35 million in funding so far for its European commercialization of rapid revascularization. ThermoVent, the first in a new paradigm of tissue treatments for bone and cartilage regeneration.
“In order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.”
KEY QUESTIONS

WHO IS CREATING THE WEALTH TO DRIVE ECONOMIC GROWTH

WHERE WILL INNOVATION COME FROM TODAY?

WHERE ARE THE INNOVATORS AND ENTREPRENEURS?

WHAT IS OUR ROLE?

HOW CAN WE HELP?
<table>
<thead>
<tr>
<th>1955</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAL-MART</td>
<td>2,100,000</td>
</tr>
<tr>
<td>GM</td>
<td>576,667</td>
</tr>
<tr>
<td>YUM! BRANDS</td>
<td>523,000</td>
</tr>
<tr>
<td>US STEEL</td>
<td>576,667</td>
</tr>
<tr>
<td>MCDONALDS</td>
<td>440,000</td>
</tr>
<tr>
<td>GE</td>
<td>210,151</td>
</tr>
<tr>
<td>IBM</td>
<td>434,246</td>
</tr>
<tr>
<td>CHRYSLER</td>
<td>167,813</td>
</tr>
<tr>
<td>STANDARD OIL</td>
<td>155,000</td>
</tr>
<tr>
<td>UPS</td>
<td>399,000</td>
</tr>
</tbody>
</table>

**TOP 5 LARGEST PUBLIC EMPLOYERS: THEN AND NOW**
WHAT HAPPENED TO THE PRIVATE SECTOR?

WAL-MART

UNIVERSITY OF MISSOURI SYSTEM

WASHINGTON UNIVERSITY

BOEING

MERCY HOSPITAL
WHERE HAVE ALL THE CORPORATE BASIC RESEARCH LABS GONE?
FAR FAR AWAY...
From Restoring the Foundation: The Vital Role of Research in Preserving the American Dream (American Academy of Arts & Sciences, 2014)
National R&D Investment
as a percentage of GDP

From Restoring the Foundation: The Vital Role of Research in Preserving the American Dream (American Academy of Arts & Sciences, 2014)
From Restoring the Foundation: The Vital Role of Research in Preserving the American Dream (American Academy of Arts & Sciences, 2014)
It is essential to document with solid evidence the returns our nation is obtaining from its investment in research and development. STAR METRICS is an important element of doing just that.

- John P. Holdren
  Assistant to the President for Science and Technology

THE TIMES THEY ARE A CHANGING

Which is to say universities will now be expected to provide the seed corn, the innovations and inventions for the future.
Regional Distribution of Research-Related Expenditures

During calendar years 2013 - 2015, the University of Missouri’s research generated over $28 million in expenditures in MO counties alone.
UNIVERSITIES AS ENGINES OF INNOVATION?

IDEAS

ENERGY

ECONOMIC POWER

UNIVERSITY

KNOWLEDGE

ENG SCI BUS ARTS
Founding Members – Mizzou Chapter
Inducted April 30, 2015

James Birchler
NAI Fellow

Hank Foley
NAI Fellow

Shubhra Gangopadhyay
NAI Fellow

Sheila Grant

Fred Hawthorne
NAI Fellow

Kattesh Katti
NAI Fellow

R. Bowen Loftin
NAI Fellow

Randy Prather

R. Michael Roberts

Peter Sutovsky
National Academy of Inventors

Mizzou Chapter -- Seven NAI Fellows:

1) R. Bowen Loftin
2) Henry C. Foley
3) James Birchler
4) Kattesh V. Katti

NEW in 2016:

5) Shubhra Gangopadhyay
6) Fred Hawthorne
7) Gabor Forgacs
COMMUNITY-UNIVERSITY-INNOVATION
“COMMUNIVATION”

Engine  Community  Wheels

Universities cannot do this alone
COMMUNIVATION REQUIRES NEW PARTNERSHIPS

COMMUNITY
- Capital
- Services
- Management
- Mentors
- Seasoned Entrepreneurs

COMMUNIVATION

UNIVERSITY
- Research
- Technical Expertise
- Entrepreneurial Ideas
- New Entrepreneurs

FEDERAL & STATE AGENCIES
- Funding
- Expectations
By 2025 UM System and the Missouri Research Quadrangle will be a national and international hotbed of innovation driven by high technology startup companies.

Born from University of Missouri research via a regional push for information and tech based economic development.
Mid-Missouri’s Entrepreneurial Ecosystem
Check out the Mid-Missouri Entrepreneurial Calendar to see a complete list of upcoming events.

If you think a resource is missing from the Entrepreneurial Ecosystem Map, please suggest an ecosystem link.
Innovation & Entrepreneurial Recognition

In FY 2015 and FY 2016, there were:

• 48 U.S. patents issued to MU inventors.
• 57 technologies were licensed.
• 6 startup companies created from those licensed technologies.
Video clip: Elemental Enzymes

https://vimeo.com/187062767/f35129f4a1
• Bio Design Program
• Faculty in Biological Engineering
• CLIMB: Student Entrepreneurial Club
• Capstone High Growth Class
• University IP & Equity
• University Colleges & Student Capital Investment
• Centennial Angel Investors
• Clinical Trials
Need more info:

Contact the Office of Economic Development
310 Jesse Hall
573-882-3087
economicdevelopment.Missouri.edu