MSU’s Empower Extraordinary Capital Campaign

- October 2014 – Launch of “public phase” of campaign.
- Multi-year project – Began in 2011, continues until 2018.
- Overall goal: $1.5 billion – As of 10/31/15, the campaign has raised $1.03 billion (63.61% of goal).
College of Natural Science

- NatSci goal: $74 million
- $38.6 million raised to date (52.18% of goal)
- Four main campaign priorities/targets
NatSci Giving Priorities

NatSci priorities within its $74 million goal:

- An Engine of Opportunity ($29 million) - Undergraduate and graduate student support
- A Force for Creativity, Discovery and Learning ($33.5 million) - Endowed faculty positions
- A Global Problem Solver ($5.5 million) - Research support
- Building a Vibrant Community ($6 million) - Facilities upgrades
MSU/NatSci Enrollment, Fall 2015

MSU overall – 50,543 students (38,485 undergrads)

NatSci Fall 2015 undergraduate majors 5,071
(898 LBC coordinate majors)

NatSci Fall 2015 incoming freshmen 1,397

NatSci Fall 2015 graduate students 919
NatSci 2015-2016 Budget

Total Recurring Budget: $64.5M – up 3.0%
$ 613k University allocation
$ 1.58M Salary increases
$ 630k 1% efficiency reduction

Total Non-Recurring Budget: $8.5M – up $992k
$553k Program allocations (up $249k)
$4.9 M Off-campus & online instruction (up $600k)
$2.89M F&A (down $90k)
**NatSci 2015-2016 Budget (cont.)**

**Additional University Support – $5.95M**
- $2.98M    Faculty start-up and retention
- $1.17M    Research
- $250k    Biology Initiative
- $604k    Other instructional
- $280k    Named/endowed professors
- $659k    TLE and A+I

**Pending Commitments – $7.0M**
- $6.0M    Faculty start-up, new hires
- $1.0M    Computational Mathematics, Science & Engineering
F&A Generated
00/01 through 14/15

(By NatSci Departments under all MAUs)

F&A Year
(March 1 - February 28)
Department Leadership Changes

- Christoph Benning, PRL director (outgoing director: Mike Thomashow)
- Andrew Christlieb, CMSE chair
- Danny Schnell, Plant Biology chair (outgoing chair: Rich Triemer)
- Yimin Xiao, Statistics and Probability interim chair (outgoing chair: Hira Koul)
Dean’s Office Changes

- **Stephen Thomas**, NatSci digital curriculum coordinator
- **Ani Hristova**, receptionist, Dean’s Office
- **Claire Gonyo**, advisor, Academic Student Affairs
- **Sue Stoltzfus**, advisor, Academic Student Affairs
- **Danielle Lopez**, coordinator, student success, Academic Student Affairs
- **Jim Stewart**, tech support, Information Technology
- **Patty Kirkey**, front-end web developer, Communications
- **Kimburley Timlin**, administrative assistant, Advancement Office
New NatSci Faculty Members

**Biochemistry and Molecular Biology**
- **Alex Dickson**, assistant professor, joint w/ CMSE (computational biochemistry)
- **Bjorn Hamberger**, assistant professor (synthetic biology of plant diterpenes)
- **Xiangshu Jin**, assistant professor, joint w/ Chemistry (structural biology)
- **Michaela TerAvest**, assistant professor (synthetic biology/bioenergy)

**Chemistry**
- **Angela Wilson**, professor (computational chemistry)
Computational Mathematics, Science and Engineering

- **Jose Perea**, assistant professor, joint w/ Math (signal analysis/topological data analysis)
- **Matthew Hirn**, assistant professor, joint w/ Math (applied math/data analysis)

Geological Sciences

- **Susannah Dorfman**, assistant professor (experimental mineralology/petrology)
New NatSci Faculty Members (cont.)

**Integrative Biology**
- Ingo Braasch, assistant professor (evolutionary developmental biology)
- Julia Ganz, assistant professor (developmental neurobiology)
- Arend Hintze, assistant professor (evolutionary computation)

**Microbiology and Molecular Genetics**
- Neal Hammer, assistant professor (microbiome ecology and evolution)

**Mathematics**
- Jun Kitagawa, assistant professor (PDEs, numerical methods)
- Willie Wong, assistant professor (geometric analysis)
Physics and Astronomy

- **Sean Couch**, assistant professor (astrophysics)
- **Alexandra Gade**, professor, joint w/ NSCL (experimental nuclear physics)
- **Filomena Maciel Nunes**, professor, joint w/ NSCL (theoretical nuclear physics)
- **Johannes Pollanen**, assistant professor, (condensed matter physics)
- **Remco Zegers**, professor, joint w/ NSCL (experimental nuclear physics)

Statistics and Probability

- **Gustavo de los Campos**, associate professor (computational genomics)
Early CAREER Award Winners

Yingda Cheng – Mathematics, 2015
Aaron Levin – Mathematics, 2014
Chris Waters – Microbiology, 2013
Matt Hedden – Mathematics, 2012
John McGuire – Physics, 2012
Teena Gerhardt – Mathematics, 2012
Thomas Hamann – Chemistry, 2011
Pengpeng Zhang – Physics, 2011
Ignacio Uriarte-Tuero – Mathematics, 2011
Dapeng Zhan – Mathematics, 2011
Eva Farre – Plant Biology, 2011
National and Int’l Award Winners

National Academy of Sciences:
Sheng-Yang He, University Distinguished Professor of plant biology and microbiology and molecular genetics; PRL

American Academy of Arts and Sciences:
Kay Holekamp, University Distinguished Professor of integrative biology

David and Lucile Packard Foundation Fellow:
Jay Strader, Physics and Astronomy

Marilyn and Sturges W. Bailey Award (Clay Minerals Society):
R. James Kirkpatrick (dean), Geological Sciences and Chemistry
National and Int’l Award Winners (cont.)

Stephen Hales Prize (American Society of Plant Biologists):
   Michael Thomashow, Microbiology and Molecular Genetics, PRL

American Association for the Advancement of Science (AAAS) Fellows:
   Christoph Benning, Biochemistry and Molecular Biology, PRL
   Lee Kroos, Biochemistry and Molecular Biology

American Physical Society Fellow:
   Marcos Dantus, Chemistry

Ecological Society of America Fellow:
   Gary Mittelbach, Integrative Biology
Geological Society of America Fellow:
  Julie Libarkin, Geological Sciences

Kavli Fellow:
  Thomas Hamann, Chemistry

Kosciuszko Foundation Collegium of Eminent Scientists Fellow:
  Piotr Piecuch, Chemistry

Soil Science Society of America Fellow:
  Bruno Basso, Geological Sciences
MSU Faculty and Staff Awards

MSU Foundation Professors:
- Christoph Benning, Biochemistry and Molecular Biology, PRL
- Federica Brandizzi, Plant Biology
- C. Robin Buell, Plant Biology
- Andrew Christlieb, Mathematics and CMSE
- Marcos Dantus, Chemistry
- Dean Della Penna, Biochemistry and Molecular Biology
- Gregg Howe, Plant Research Laboratory
- Shannon Manning, Microbiology and Molecular Genetics
- Alexander Volberg, Mathematics

Lappan-Phillips Professor in Science Education:
- Joseph Krajcik, Create for STEM Institute
University Distinguished Professors:

Marcos Dantus, Chemistry
Linda Mansfield, Microbiology and Molecular Genetics
Hendrik Schatz, Physics and Astronomy, NSCL, FRIB
Thomas Sharkey, Biochemistry and Molecular Biology
Michael Thoennessen, Physics and Astronomy and NSCL

William J. Beal Outstanding Faculty Award:

C. Robin Buell, Plant Biology
Thomas Sharkey, Biochemistry and Molecular Biology
Edward Walker, Microbiology and Molecular Genetics
### MSU Faculty and Staff Awards (cont.)

**Teacher-Scholar Award:**
- **Brian O’Shea**, Physics & Astronomy, LBC

**Distinguished Academic Staff Award:**
- **Steven Poulios**, Chemistry
- **Pavel Sikorskii**, Mathematics

**Excellence-in-Teaching Citation:**
- **Emily Weigel**, Integrative Biology

**Innovation of the Year Award:**
- **Merlin Bruening**, Chemistry

**AT&T Award, Best Technology Enhancement:**
- **Melanie Cooper**, Chemistry

**WRC Inspirational Woman of the Year Award:**
- **Jeanne Wald**, Mathematics

**RCPD Spirit of Ability Award:**
- **Ben Schmidt**, Mathematics
Key Initiatives
Increasing Student Success: Undergraduate Education

- Dow STEM Scholars
- Levers HHMI Grant
- Chemistry (CLUE/beSocratic)
- Biology Initiative
- Introductory Physics
- Quantitative Literacy
$5M award (Oct. 2014) Herbert H. and Grace A. Dow Foundation (Chivukula and Renn)
  ➢ $2.5M to address holistic needs of STEM students who enter underprepared in mathematics
  ➢ $2.5M endowment to support students in program
  ➢ Collaboration between NatSci, Lyman Briggs, Engineering and the Neighborhoods

Outline of Program Components
  ➢ Summer Math Bridge Program (Sikorskii, Chadwick, Allen)
  ➢ CEM 121 – Explorations in Chemistry (Posey)
  ➢ Intensive and Intrusive Advising, Freshman Seminar (Rennie, Hopson, Yoo)
  ➢ Program Assessment (Vergera)
Dow STEM Scholars (cont.)

- **Initial Results**
  - Recruited 54 students in summer 2015 program (scored ≤ 10 on Math Placement Exam)
  - 52 (!) completed program; 40 (78%) moved directly into MTH 103 this fall

- **Goals for this year**
  - Assess success of this year’s cohort, revise and strengthen program.
  - Recruit 100 Dow STEM Scholars for summer 2016.

- **Ultimate Goal**: provide support to all MSU STEM students who need it!
$1.5M, 5-year grant from HHMI to reform STEM gateway courses (Chivukula, PI)
- Chemistry Lab (Cooper & Posey)
- Physics Lab (Cabellero & Tessmer)
- Avida-ED Lab Modules (Pennock & Smith)
- Modeling-Based Calculus (Zeleke & Bell)

All Curricular Projects underway and personnel hired

Gateway Collaborative
- MSU STEM Educational Alliance
- OVPRGS Research Forum on Undergraduate STEM Education
- Gateway Fellows

Engaging faculty to determine the core ideas, science practices and cross-cutting concepts...

Promotes changes in assessment practices

Leads to changes in classroom practice
CLUE Curriculum for Chemistry

- Focus on core chemistry ideas, cross-cutting concepts, science practices
  - See AAU STEM Education Initiative (Cooper et al. 2015, Science)
- Facilitated interaction in class meetings
- Open-ended response items on homework and exams
  - beSocratic homework system allows written and drawn responses
- Pioneered and validated by externally funded DBER research
- Expanded in AY 2015-16 to all sections of CEM 141/142
Biology Initiative

**Goal:** To improve biology education and establish a continuous improvement model focused on student success

**Key points:**
- Align curriculum to focus on science practices and big ideas, from gateway courses to capstone experiences
- Joint oversight of introductory and foundational courses that serve majors from multiple biology department and programs
- Addition of graduate TAs and undergraduate LAs to facilitate active learning
- Addition of course curriculum coordinators
- New laboratory course to serve students pursuing health science and biomedical careers
- Investments to support research-based teaching practices, including tenure-stream hires, and to lower student-to-faculty ratios in core courses
Transformation of Introductory Physics

- Focus on core physics ideas, cross-cutting concepts, and science practices
  - See AAU STEM Education Initiative (Cooper et al. 2015, *Science*)
- Pioneered by NSF-funded Physics Education Research Laboratory
- Group-based learning, computational modeling, interdisciplinary reasoning
- Projects and Practices in Physics (P³)
  - New model for PHY 183 (Mechanics for physicists & engineers)
  - Students work in groups to develop models that explain motion
- Physics at the Cellular Level (P@CL)
  - Transforms PHY 231/232 for life-science majors
  - Interdisciplinary reasoning that applies physics concepts to biological systems
  - Will be piloted in AY 16-17
Quantitative Literacy

- Diversify options for satisfying MSU graduation requirement in mathematics
- Focus on practical, everyday applications of quantitative reasoning
- Serve students who are not aiming at quantitative majors
- Maintain rigor equivalent to MTH 103 (College Algebra)

Pilot program
- Summer session of MTH 110 (10 students)
- MTH 101 (QL1) in Fall 2015 (100 students)
- MTH 102 (QL2) in Spring 2016 (200 students)

Anticipated Expansion
- 1000 students in MTH 101/102 in AY 16-17
- Ultimate capacity > 2000 students
Goal: “To recruit more than 100 new faculty members to our research team to help accelerate finding solutions to the recognized Grand Challenges.”

- GII aligns with the U.S. Office of Science and Technology Policy’s 21st century Grand Challenges, which is part of the President’s Strategy for American Innovation.

- Funding for the initiative – $17.5 million in recurring funds – was approved by MSU Board of Trustees in 2014.

- New and enhanced research efforts will also provide a rich learning experience for undergraduate and graduate students at MSU and increase the university’s stature as a center for STEM education.
Priority areas:
- Plant genomics
- Plant stress
- CMSE
- Quantum Chromodynamics
- Ultrafast science
- Mass spectrometry
- Antibiotic resistance
- STEM education
Key Grants
Key Grants

National Science Foundation:
- $22M to continue the research, education and outreach activities of the BEACON Center for the Study of Evolution in Action
- $5.1M to explore the diverse world of mint, the world’s sixth largest family of flowering plants
- $700k to identify the genes that regulate specific signals made by African weakly electric fish

USDA’s National Institute of Food and Agriculture:
- $4.9M to develop big-data approaches to better manage water and fertilizer in agriculture and climate variability
Key Grants (cont.)

U.S. Department of Energy:
- $5M to better understand how biofuel crops acquire nitrogen, providing insights that could help maximize yields while minimizing fertilizer use

National Institutes of Health:
- $4.15M to examine how a high-fat diet interacts with a common sunscreen chemical and what effect it has on breast cancer risk
College of Natural Science
Awards Presentation
2015-16
NatSci Outstanding Faculty Award 2015-16

Lee R. Kroos
Biochemistry and Molecular Biology
Microbiology and Molecular Genetics
NatSci Outstanding Faculty Award
2015-16

Georgios Pappas
Mathematics
NatSci Outstanding Faculty Award
2015-16

Milton R. Smith
Chemistry
NatSci Outstanding Faculty Award
2015-16

G. Mark Voit
Physics and Astronomy
College of Natural Science
NatSci Teacher-Scholar Award
2015-16

Susanne Mohr
Physiology
AgBioResearch
NatSci Teacher-Scholar Award
2015-16

Christopher M. Waters
Microbiology and Molecular Genetics
NatSci Undergraduate Teaching Award
2015-16

Susan F. Allen
Mathematics
NatSci Undergraduate Teaching Award
2015-16

L. Karl Olson
Physiology
NatSci Junior Faculty Mentoring Award
2015-16

Kathryn M. Doig
Biomedical Laboratory Diagnostics
NatSci Postdoctoral Mentoring Award
2015-16

Dean DellaPenna
Biochemistry and Molecular Biology
NatSci Distinguished Academic Staff Award
2015-16

A. Ardeshir Azadnia
Chemistry
Undergraduate Academic Advisor Award
2015-16

Jason R. Gallant
Integrative Biology
Graduate Academic Advisor Award
2015-16

Kristin N. Parent
Biochemistry and Molecular Biology
NatSci Support Staff Award
2015-16

Amy S. Porter
Physiology
NatSci Support Staff Award
2015-16

Brenda L. Wenzlick
Physics and Astronomy
NatSci Excellence-in-Teaching Citation
2015-16

Luke M. Williams
Mathematics
Lorena V. Blinn Endowed Teaching Award 2015-16

Matthew P. Rowe
Integrative Biology
James D. Hoeschele Endowed Teaching Award 2015-16

Saul Beceiro Novo
Physics and Astronomy
Ronald W. Wilson Endowed Teaching Award 2015-16

Suzanne M. Thiem
Entomology
Harlo Mervyn Mork Memorial Excellence in Teaching Award 2015-16

Knute Gundersen
Entomology
NatSci Faculty Teaching Prize Recipients 2015-16
<table>
<thead>
<tr>
<th>Susan F. Allen, Mathematics</th>
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<tbody>
<tr>
<td>Warren F. Beck, Chemistry</td>
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<tr>
<td>Edward F. Brown, Physics &amp; Astronomy</td>
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<tr>
<td>Ryan Kimbirauskas, Center for Integrative Studies in General Science</td>
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<tr>
<td>John Mugg, Plant Biology</td>
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<tr>
<td>Russell Schwab, Mathematics</td>
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<tr>
<td>Laura L. Symonds, Neuroscience Program</td>
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</table>
Family Resource Center
Outstanding Supervisor Award
2015-16
Outstanding Supervisor Award
2015-16

John A. Gerlach
Biomedical Laboratory Diagnostics