Appendices

2017 Montana State University
Comprehensive Self-Study Report

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Appendix A

Acronym List

Acronym	Full Title
AA	Associate of Arts
AAC&U	Association of American Colleges & Universities
AAS	Applied Associate of Science
AASHE	Association for the Advancement of Sustainability in Higher Education
AAUP	American Association of University Professors
ABET	Accreditation Board for Engineering and Technology
ACRL	Association of College & Research Libraries
ACT	American College Testing
ADA	Americans with Disabilities Act
ADFAC	Americans with Disabilities Act Facilities Advisory Committee
ADVANCE	NSF - Increasing the Participation and Advancement of Women in Academic Science and
ADVANCE Project TRACS	Empirically Investigating Transformation through Relatedness, Autonomy, and Competence Support
AGB	Association of Governing Boards
ALO	Accreditation Liaison Officer
AP	Advanced Placement
APLU	Association of Public and Land-grant Universities
APPA	Association of Physical Plant Administrators
ARRA	American Recovery & Reinvestment Act
AS	Associate of Science
ASMSU	Associated Students of Montana State University
ATS	Applicant Tracking System
AY	Academic Year
AYCSS	Allen Yarnell Center for Student Success
BBCC	Bracken Business Communications Clinic
BC	Budget Committee
BHS	Bozeman High School
BIFAD	Board for International Food and Agriculture Development
BOR	Board of Regents
CAAT	Campus Advising Action Team
CAP	Campus Action Plan
CAS	Certificates of Applied Science
CASE	Council for the Advancement and Support of Education
CBA	Collective Bargaining Agreement
CCN	Common Course Numbering
CEO	Chief Executive Officer
CEU	Continuing Education Unit
CFE	Center for Faculty Excellence
CFAC	Computer Fee Allocation Committee

CICEP	Commission on Innovation, Competitiveness, and Economic Prosperity
CIM	Course Inventory Management
CIO	Chief Information Officer
CLEP	College Level Examination Program
CMHRR	Center for Mental Health Research and Recovery
CNC	computer numerically controlled
CO-OP	Caring for Our Own Program
COBRE	Centers of Biomedical Research Excellence
CORE 2.0	MSU's general education requirements
COT	College of Technology
CPC	Curriculum and Program Committee
CPDC	Campus Planning, Design and Construction
CSA	Community Supported Agriculture
CUBA	College and University Business Administration
CUPA	College and University Personnel Association
D2L	Desire2Learn
DEAL	Developing Excellence in Academic Leadership
DISC	Data Infrastructure & Scholarly Communication
DMZ	demilitarized zone, specialized secure IT network
DSEL	Design Sandbox for Engaged Learning
EFAC	Equipment Fee Allocation Committee
EHS	Environmental Health and Safety
EOP	Emergency Operations Plan
EPSCoR	NSF's Experimental Program to Stimulate Competitive Research
ERP	Enterprise Resource Planning
EU	Extended University
EWB	Engineers without Borders
F&A	Facilities and administrative
FAR	Faculty Athletics Representative
FAFSA	Free Application for Student Federal Aid
FCI	Facilities Condition Inventory
FEG	Faculty Excellence Grants
FEMA	Federal Emergency Mangement Agency
FERPA	Family Educational Rights and Privacy Act
FS	Facility Services
FTE	Full Time Equivalent
FTFT	First-Time Full-time student
FY	Fiscal Year
GAAP	Generally Accepted Accounting Principles
GASB	Governmental Accounting Standards Board
GHG	Green House Gas
GPA	Grade Point Average

GRE	Graduate Records Examination
GRW	Graduate Recruitement Weekend
GS	Graduate School
GSF	Gross Square Footage
GTA	Graduate Teaching Assistant
HASS	Humanities, Arts and Social Sciences
HERS	Higher Education Resource Services
HID	High-Intensity Discharge
HPCAG	High Performance Computing Advisor Group
HR	Human Resources
HRSA	Health Resources and Services Administration
IB	International Baccalaureate
IBC	Institutional Biosafety Commmittee
IDeA	Institutional Development Award
IEP	Innovation and Economic Prosperity
I LEAD	Indian Leadership Education and Development
ILL	Interlibrary Loan
INBRE	IDeA Network of Biomedical Research Excellence
IoE	MT EPSCoR's Institute on Ecosystems
IP	Intellectual Property
ITAC	Instructional Technology Advisory Team
KPI	Key Performance Indicator
LAD	Legislative Audit Division
LCD	Liquid Crystal Display
LEAP	Liberal Education & America's Promise
LED	Light-emitting diode
LEED	Leadership in Energy and Environmental Design
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer
LMP	Landscape Management Plan
LMSU	Leadership Montana State Univeristy
LOI	Letters of Interest
LRBP	Long Range Building Program
LRCDP	Long Range Campus Developmet Plan
MAA CoMInDS	Mathematical Association of America College Mathematics Instructor Development Source
MAES	Montana Agricultural Experiment Station
MEERC	Montana Engineering Education Research Center
MLC	Math Learning Center
MOR	Museum of the Rockies
MOU	Memorandum of Understanding
MPLEX	Math Placement Level Exam
MREDI	Montana Research & Economic Development Initiative

MSU	Montana State University
MSUAF	MSU Alumni Foundation
MTA	Material Transfer Agreements
MUS	Montana University System
NACUBO	National Association of College and University Business Officers
NAIC	Norm Asbjornson Innovation Center
NASA	National Aeronautics and Space Administration
NCAA	National Collegiate Athletic Association
NIGMS	National Institute of General Medical Sciences
NSF	National Science Foundation
NSF Project TRACS	NSF Project TRACS: Empirically Investigating Transformation through Relatedness, Autonomy, and Competence Support
NSF/GSS	NSF Survey of Graduate Students and Postdoctorates in Science and Engineering
NTT	Non-Tenure Track
NWCCU	Northwest Commission on Colleges and Universities
OCHE	Montana Office of the Commissioner on Higher Education
OIP	Office of International Programs
OLAC	Online Learning Advisory Committe
OMB	US Office of Management and Budget
OPA	Office of Planning and Analysiss
OpTeC	Optical Technology Center
ORC	Office or Research Compliance
OSE	Office of Student Engagement
OSP	Office of Sponsored Programs
OSU	Oklahoma State University
OTO	One Time Only
PC	Planning Committee
PD&T	Professional Development and Training
PEC	President's Executive Council
PIRE	Partnerships in International Research and Education
PLA	Prior Learning Assessment
PMO	Portfolio Management Office
PoS	Program of Study
PTSD	Post Traumatic Stress Disorder
PV	Photo Voltaic
Q-Core course	Quantitative Reasoning Core Course
R2L	Return-to-Learn Program
R&D	Research and Development
RCi	Research Cyberinfrastructure
RED	Research and Economic Development
RFI	Request for Information
RFP	Request for Proposals

RSC	Radiation Safety Committee
RSW	Research and Scholarly Work
SAT	Scholastic Aptitude Test
SBI	Smart Building Initiative
SIP	Strategic Investment Proposal
SMRC	Science Math Resource Center
SPC	Strategic Planning Committee
SPM	Space Planning and Management
SRM	Safety and Risk Management
SRSW	Strengthening Research and Scholarly Work
SSC	Student Success Coordinator
SSS	Student Support Services
STEM	Science, Technology, Engineering and Math
SUB	Strand Union Building
TEAL	Technology Enhanced Active Learning
THG	Town Harvest Garden
TMP	Transportation Master Plan
TMS	Transcranial Magnetic Stimulation
TRiO	U.S. Department of Education - Upward Bound, Talent Search, and Student Support
T	Tenured
TT	Tenure-Track
TTO	Technology Transfer Office
UC	University Council
UFPB	University Facilities Planning Board
UGC	University Graduate Council
UIT	University Information Technology
UPS	Uninterrupted Power Supply
VPRED	Vice President for Research and Economic Development
WIMU	Washington, Idaho, Montana, Utah Regional Program in Veterinary Medical Education
WWAMI	Washington, Wyoming, Alaska, Montana, Idaho medical education program
WildFIRE **PIRE**	NSF Partnership for International Research and Education
WTI	Western Transportation Institute
WUE	Western Undergraduate Exchange
YAM	Youth Aware of Mental Health

Appendix B

List of Weblinks in Self-Study

Weblink address	Standard	File type
http://www.montana.edu/strategicplan/	1.A.1	
http://mus.edu/board/meetings/2011/Dec2011cc/MINUTESBOR11-17-18-2011FINAL.pdf	1.A.1	PDF
http://www.montana.edu/strategicplan/	1.A.1	
http://mus.edu/board/meetings/2014/Sept2014/ARSA/164-2010-R0914.pdf	1.A.1	PDF
http://www.montana.edu/accreditation/documents/accdocs/Mid-Cycle Report without Appendix.pdf	1.A.2	PDF
http://www.montana.edu/strategicplan/progress/	1.A.2	
http://www.montana.edu/strategicplan/	1.B.1	
http://mus.edu/board/meetings/2014/Nov2014/Sept_2014_BOR Mintues.pdf	1.B.1	PDF
http://www.montana.edu/strategicplan/progress/	1.B.1	
https://mus.edu/borpol/bor200/bor200.asp	2.A.1	
http://www.montana.edu/policy/	2.A.1	
http://www.montana.edu/asmsu/	2.A.1	
http://www.montana.edu/opa/coms/facsen.html	2.A.1	
http://www.montana.edu/professionalcouncil/	2.A.1	
http://www.montana.edu/opa/coms/staffsenate.html	2.A.1	
https://www.montana.edu/provost/nontenure-cba/art8.html	2.A.1	
http://www.montana.edu/deanscouncil/	2.A.1	
http://www.montana.edu/facultysenate/	2.A.1	
http://www.montana.edu/professionalcouncil/	2.A.1	
http://www.montana.edu/opa/coms/staffsenate.html	2.A.1	
http://www.montana.edu/planningcouncil/	2.A.1	
http://www.montana.edu/outreachengagementcouncil/	2.A.1	
http://www.montana.edu/budgetcouncil/	2.A.1	
http://www.montana.edu/universitycouncil/	2.A.1	
http://www.montana.edu/opa/coms/pec.html	2.A.1	
http://www.montana.edu/opa/orgcharts/	2.A.1	
http://www.montana.edu/opa/coms/pec.html	2.A.1	
http://leg.mt.gov/bills/mca/CONSTITUTION/X/9.htm	2.A.2	
https://mus.edu/borpol/default.asp	2.A.2	
http://mus.edu/che/	2.A.2	
https://mus.edu/borpol/bor200/205-2-1.pdf	2.A.2	PDF
http://mus.edu/board/	2.A.4	
https://mus.edu/board/meetings/meetingschedule.asp	2.A.4	
https://mus.edu/board/meetings/agendas-and-minutes.asp	2.A.4	
https://mus.edu/board/meetings/AgendaHandbook.pdf	2.A.4	PDF
https://mus.edu/board/BORmembers.asp	2.A.4	
https://mus.edu/board/StudentRegentAppointmentProfile.pdf	2.A.4	PDF
https://mus.edu/board/CodeOfExpectations.pdf	2.A.4	PDF
https://mus.edu/board/default.asp	2.4.5	
https://mus.edu/borpol/bor200/201-7.pdf	2.4.5	PDF
https://mus.edu/board/	2.4.5	
https://mus.edu/borpol/bor100/103.pdf	2.A.6	PDF

https://mus.edu/borpol/bor200/219.pdf	2.A.6	PDF
https://mus.edu/borpol/bor700/705-1.pdf	2.A.6	PDF
http://mus.edu/board/ARSAcommittee.asp	2.A.6	
https://mus.edu/data/StratPlan/StrategicPlan.asp	2.A.6	
https://mus.edu/borpol/bor200/205-1.pdf	2.A.7	PDF
https://mus.edu/borpol/bor200/205-2.pdf	2.A.7	PDF
https://mus.edu/borpol/bor700/705-2.pdf	2.A.7	PDF
https://mus.edu/borpol/bor700/705-1.pdf	2.A.8	PDF
http://www.montana.edu/opa/orgcharts/	2.A.9	
http://www.montana.edu/president/biography.html	2.A.10	
http://www.montana.edu/opa/orgcharts/	2.A.11	
http://www.montana.edu/policy/	2.A.12	
http://www.montana.edu/policy/faculty_handbook/	2.A.12	
http://catalog.montana.edu/code-conduct-policies-regulations-reports/	2.A.12	
http://www.montana.edu/knowyourcode/	2.A.12	
http://catalog.montana.edu/code-conduct-policies-regulations-reports/alcoholdrugtobacco-policy/	2.A.12	
http://catalog.montana.edu/code-conduct-policies-regulations-reports/common-hour-policy/	2.A.12	
http://catalog.montana.edu/code-conduct-policies-regulations-reports/family-educational-rights-privacy-act-ferpa/	2.A.12	
http://www.montana.edu/titleix/	2.A.12	
http://www.montana.edu/equity/	2.A.12	
http://www.montana.edu/policy/student_conduct/	2.A.12	
http://www.montana.edu/policy/faculty_handbook/annual_review_retention_tenure_promotion.html	2.A.12	
http://catalog.montana.edu/	2.A.12	
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https://www.lib.montana.edu/about/borrow/index.html	2.A.13	
https://www.lib.montana.edu/policy/	2.A.13	
https://www.lib.montana.edu/find/index.html	2.A.13	
http://www.lib.montana.edu/channel/item.php?id=EaPuw0x0QNQ	2.A.13	
http://www.lib.montana.edu/archives/index.html	2.A.13	
http://www.lib.montana.edu/archives/copy.html	2.A.13	
http://www.lib.montana.edu/archives/photos.html	2.A.13	
http://www.lib.montana.edu/archives/read.html	2.A.13	
http://catalog.montana.edu/undergraduate-admissions/	2.A.14	
http://catalog.montana.edu/undergraduate-admissions/	2.A.14	
http://www.montana.edu/admissions/transfer.html	2.A.14	
https://atlas.montana.edu:9000/pls/bzagent/hwzkxfer.p_selstate	2.A.14	
http://www.montana.edu/admissions/orientation/placement.html	2.A.14	
http://www.montana.edu/registrar/prior_learning_assessment/index.html	2.A.14	
https://mus.edu/borpol/bor300/301-19.pdf	2.A.14	PDF
https://mus.edu/borpol/bor300/301.19_PLAExpandedPolicyRecommendations.pdf	2.A.14	PDF

http://www.montana.edu/deanofstudents/studentrights.html	2.A.15	
http://www.montana.edu/legalcounsel/documents/proposed/Student Bill of Rights Final Draft.pdf	2.A.15	PDF
http://www2.montana.edu/policy/student_conduct/student_conduct_code.htm	2.A.15	
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http://www.montana.edu/policy/purchasing/purch300.html#300	2.A.27	
https://www.montana.edu/accreditation/attach/20151120132718-BOR Policy 302.pdf	2.A.27	PDF
http://www.montana.edu/policy/free_speech/	2.A.27	
https://www.montana.edu/provost/documents/nontenure/2017MSUCBA.pdf	2.A.27	PDF
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https://www.montana.edu/provost/documents/nontenure/2017MSUCBA.pdf	2.A.28	PDF
http://leg.mt.gov/bills/mca/2/2/2-2-103.htm	2.A.28	
http://www.montana.edu/policy/faculty_handbook/ethical_professional_standards.html	2.A.28	
http://www.montana.edu/policy/faculty_handbook/	2.A.28	
http://www.montana.edu/policy/research/misconduct.html	2.A.28	
http://www.montana.edu/policy/reporting-violations/	2.A.28	
http://www.montana.edu/policy/research/misconduct.html	2.A.28	
https://mus.edu/borpol/bor900/bor900.asp	2.A.28	
http://www.nacubo.org/Membership_and_Community/Comprehensive_and_Doctoral_Institutions.html	2.A.28	
http://www.nacubo.org/About_NACUBO/Corporate_Alliances/Sponsorship_Opportunities/Publication_sponsorships/CUBA.html	2.A.28	
http://mus.edu/data/operating_budgets/FY16/07 MSU-Bozeman FY16.pdf	2.A.28	PDF
https://mus.edu/board/meetings/2016/Nov2016/AdminBudget/Nov2016-AdminBudget.asp	2.A.28	
http://www.montana.edu/opa/Fall Institutional Report 20161130.pdf	2.B.1	PDF
http://www.montana.edu/opa/facts/quick.html	2.B.1	
http://www.montana.edu/equity/handbook.html	2.B.1	

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http://www.montana.edu/policy/personnel/	2.B.2	
hhttp://www.montana.edu/policy/faculty_handbook/annual_review_retention_tenure_promotion.html	2.B.2	
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http://www.montana.edu/policy/performance_evaluation/index.html	2.B.2	
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https://www.montana.edu/provost/faculty/sabbaticals.html	2.B.3	
http://www.montana.edu/opa/cds16.pdf	2.B.4	PDF
http://www.montana.edu/opa/kpi/FY16KPI_Total.pdf	2.B.4	PDF
http://www.montana.edu/opa/Fall Institutional Report 20161130.pdf	2.B.4	PDF
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Appendix C

Performance Indicator Data and Codebook

Core Theme Performance Indicator Data

Learning

Metric		09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
L.1 Assess, and improve where needed, student learning of critical knowledge and skills	Percentage of programs engaged in program assessment	Original plans in place		Plan improve-ment		Most revised UG plans submitted; initial assessments due Fall '14	Gr plans templated/ revised; assessment reports due Spring '15	Reports submitted by 82% of 2 year, 60% of 4 year, 48% of Masters and 30% of PhD programs	Submission deadline September 2017
	Percentage of Core 2.0 areas doing assessment				Redef outcomes, began assess	Most Core outcomes defined, two completed assessments	All Core plans to be completed; three assessments this year	Assessments in some Core areas ongoing; UPdate Core ongoing	7 of 7 Core areas have assessment plans and 5 of 7 areas have
L.2 Increase graduation rates at MSU.	Bachelor Graduation Rate (entering cohort from 6 years prior)	48%	47%	51%	49%	50%	50%	52%	53%
	Graduate Degrees Awarded	519	548	591	584	562	673	600	648
	Doctoral Degrees Awarded	45	56	53	49	56	79	60	84
	Associate Degrees Awarded		9	31	28	40	57	60	82
	Workforce Certificates Awarded		13	20	47	46	66	65	78
	FTFTF Retention Rate (entering cohort from prior Fall)	72%	74%	74%	74%	76%	76%	77%	76%
L.3 Increase job placement and further education rates	Employed in Major Field or Position of Choice (one year post-grad)	57%	66%	63%	64%	66%	68%	71%	78%
	Graduate School Enrollment (one year post-grad)	20%	25%	22%	18%	23%	16%	18%	17%

Sources: Provost's Office, Office of Planning and Analysis, OCHE Student Data Warehouse, Career Services Career Destinations Survey two classes earlier

Discovery

Metric			09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
D.1 - Elevate the research excellence and recognition of faculty.	MSU will increasingly attract and retain faculty of national and international recognition.	Tenure-Track/ Tenured Faculty			554	533	543	548	567	583
		Faculty w Natl/Intl Refereed Scholarly Products						319	338	367
		Academic Analytics Avg Fac Percentile					48.69	47.84	48.56	
	National and international recognition of MSU faculty as measured through Natl and Intl Awards and Honors		Uneven data collection effort through FAD reporting			AI implementation	90	121	111	129
	STEM R&D expenditures Carnegie Rank		93	97	98	99	104	104		
	Non-STEM R&D expenditures Carnegie Rank		89	87	92	94	79	72		
	Science and engineering resarch staff Carnegie Rank		100	103	100	103	99	104		
	Doctoral conferrals Carnegie Rank		106	106	106	106	116	116		
D.2 Enhance infrastructure in support of research, discovery and creative activities.	Funding for capital projects from public and private		$16,906,171	$7,462,194	$20,696,809	$5,617,773	$14,587,915	$8,142,334	$12,004,831	
	Grant-sponsored investment in centers, core facilities and resources (annual amt, cumulative assessment)		$5,105,060	$5,839,575	$16,498,363	$6,613,660	$1,896,921	$1,458,822	$3,292,464	
D.3 Expand the scale, and breadth, and quality of doctoral education	Percentage of faculty who advise doctoral students (T/TT/NTT)						46.9%	50.6%	48.8%	
	Graduate student headcount		1924	1980	1965	1888	2030	2050	1981	2040
	Doctoral student headcount		401	396	397	420	481	537	555	596
	Graduate Degrees Awarded		519	548	591	584	562	673	600	648
	STEM Masters and Doc Degrees Awarded		239	295	297	328	352	366	345	349
	All Doctoral Degrees Awarded		45	56	53	49	56	79	60	84
	The number of faculty scholarly products co-authored/presented with graduate students		No comprehensive data collection effort			AI not implemented for grads	383	578	528	617

Sources: Provost's Office, Activity Insight, Academic Analytics, Office of Planning and Analysis, NSF HERD and Academic R&D Survey, NSF/GSS Survey of Graduate Students and Post Docs in Science and Engineering, OCHE Student Data Warehouse, University Business Services, Office of Sponsored Programs

Engagement

Metric			09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
E.1 Strategically increase service, outreach and engagement at MSU	Campus-wide coordinating infrastructure to support and					OEC/OAE	OEC/OAE	OEC/OAE	OEC/OAE	OEC/OSE
	Percent of faculty involved in service, outreach and engagement.	Faculty (currently only have data on faculty through Activity Insight)				48.5%	57.4%	60.4%	63.9%	67.1%
	Number of MSU service, outreach, and engagement activities (faculty and students)	Faculty and students					3276	4190	4705	
	Percentage of students actively participating in student organizations					36.5%	54.4%	66.5%	61.3%	
E.2 MSU graduates will have global and multi-cultural understanding and experiences.	Percentage of MSU students participating in cross-cultural study, work or service experiences, incorporating both academic preparation and post-experience reflection					2.6%	2.8%	2.7%	2.5%	
E.3 MSU students, faculty and staff will have increased opportunities for leadership development.	Number of opportunities for leadership development and practice for faculty, staff and students (no data on students)	Faculty & Staff					22	23	39	
	Percent of faculty and staff participating in leadership development activities (no data on students)	Faculty & Staff					14.9%	10.8%	16.8%	

Source: Office of Planning and Analysis, Activity Insight, Office of Activities and Engagement, Office of International Programs, Center for Faculty Excellence, Professional Development & Training

Integration

Metric		09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
I.1 Increase the integration of learning, discovery and engagement.	Percent of students with substantial curricular experience that integrates learning, discovery and engagement						No way to measure	No way to measure	
	Department role and scope documents will include substantial integration of learning, discovery and engagement						JAGS	JAGS	100% Role and Scopes in Development
	Community-based research projects					158	331	353	317
	Number of faculty scholarly products with undergraduate and graduate students					368	664	518	711
I.2 Increase work across disciplines.	Number of students completing interdisciplinary				597	746	741	730	782
	Interdisciplinary research and creative projects					844	1718	1800	1535

Source: Activity Insight, OCHE Data Warehouse

Access

Metric		09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
A.1 Educate more students while maintaining the quality of programs.	MT Undergrad Headcount Enrollment (Fall)	7,893	8,240	8,586	8,680	8,828	8,653	8,683	8,983
	New Transfer Students (Summer and Fall)	805	924	987	1,010	933	858	858	918
	Graduate Student Headcount Enrollment (Fall)	1,924	1,980	1,965	1,888	2,030	2,050	1,981	2,040
	Online Credits (AY)	12,283	15,536	14,755	16,212	20,372	21,027	20,406	20,840
	Online Courses (AY)	124	166	162	213	251	263	267	281
	Gallatin College Headcount Enrollment (Fall)		100	199	228	324	440	450	514
	% Financial Need Met	72%	74%	74%	72%	72%	74%	75%	74%
	Total Headcount Enrollment (Fall)	12,764	13,559	14,153	14,660	15,294	15,421	15,688	16,440
A.2 Diversify the student body.	Native American Student Headcount Enrollment (Fall)		500	545	580	558	587	578	650
	Other Under-Represented Ethnicity and Race Headcount		904	947	1,065	1,193	1,191	1,174	1,507
	International Student Headcount Enrollment (Fall)	460	516	553	599	608	673	717	722
	Non-Traditional Age Student Headcount Enrollment (Fal	2,247	2,447	2,655	2,781	2,693	2,518	2,410	2,404

Sources: MSU Office of Planning and Analysis, OCHE Student and Courses Data Warehouse, Banner Student Data, MSU Registrar's Reports

Stewardship

Metric			09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
S.1 Human Resources: Attract, develop and retain the best faculty and staff to achieve the MSU mission	Average staff salary compared to peer market average		81%	78%	77%	80%	83%	80%	80%	82%
	Average faculty salary compared to peer market average		76%	76%	76%	77%	78%	80%	79%	81%
	Average administrative salary compared to peer market average		70%	71%	69%	66%	66%	69%	69%	70%
	Faculty and staff participation in professional						3961	5,312	5,730	
S.2 Physical Resources: Enhance aesthetic appeal and functional quality of MSU physical resources to support high quality learning, research and work environments.	% of classrooms with technology rated tier 3 or above				2%	6%	7%	12%	15%	
	% of classrooms with technology rated tier 2				58%	62%	62%	67%	78%	
	Increase accessibility to campus facilities (annual amt, cumulative assessment)	Projects		10	9	14	18	16	5	
		Cost		$798,700	$3,363,900	$1,465,700	$1,898,200	$308,100	$942,427	
	Develop and implement a comprehensive master plan				comprehensive plan not funded;	comprehensive plan not funded	comprehensive plan not funded	comprehensive plan not funded	Bicycle Master Plan	Diversity Plan Transportation
S.3 Economic Resources: Increase and effectively allocate resources in support of the MSU Strategic Plan.	Budgeting processes will reflect alignment with the MSU strategic plan				SIP; Allocation Strategy		Budget Council, Planning Council	UPDate Budget	New model, investment pools	New model, investment pools
	Improved efficiency and effectiveness of mission support processes				Data gathering, benchmarking, planning, and initial implementation		Projects underway, assessment in development		Metrics systematically collected, all improving	Metrics systematically collected, all improving
	Fiscal resources in support of the MSU Strategic Plan		Discussions with VPAF and others		MSUAF, RED, Legislative requests, Performance Funding					
S.4 Environmental Resources: Promote sustainable stewardship and a culture of resource conservation at MSU.	Greenhouse Gas Emissions (MT)		59,156	57,013	57,356	50,635	49,717	50,050	49,975	
	Diverted waste from landfill		6.0%	7.2%	9.5%	9.2%	11.8%	15.8%	19.2%	

Sources: MSU Office of Planning and Analysis, CUPA and OSU Salary Surveys, Center for Faculty Excellence and HR Professional Development & Training, Campus Planning, Design, and Construction, Facilities Services, ADA

Performance Indicator Codebook

identifier	Indicator		Data	Source
L.1.1	Mastery of disciplinary knowledge as developed in departmental learning assessment plans		Plans and assessments submitted to Provost Office by departments annually, currently measuring presence of plans and assessments	Provost Office
L.1.2	Undergraduate student mastery of critical thinking, oral communication, written communication, quantitative reasoning, understanding of diversity and		Plans and assessments submitted to Provost Office by Core Committees, currently measuring presence of plans and assessments, with examples of achievement	Provost Office
L.2.1	Bachelor Graduation Rate (entering cohort from 6 years prior)		First-Time Full-Time degree-seeking student cohort, IPEDS definition	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
L.2.2	Graduate Degrees Awarded		Count of graduate certificates, masters, specialist and doctoral degrees awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
	Doctoral Degrees Awarded		Count of doctoral degrees awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
L.2.3	Associate Degrees Awarded		Count of AA, AS, AAS degrees awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
	Workforce Certificates Awarded		Count of one- and two-year undergraduate workforce certificates awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
L.2.4	FTFTF Retention Rate (entering cohort from prior Fall)		First-Time Full-Time degree-seeking student cohort, IPEDS definition	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
L.3.1	Employed in Major Field or Position of Choice (one year post-grad)		Percent of students reporting in Career Destinations Survey full-time employment in position related to major or in position of their choosing, one year post-graduation, all degree levels	Career Services
L.3.2	Graduate School Enrollment (one year post-grad)		Percent of students reporting in Career Destinations Survey full- or part-time enrollment in graduate school, one year post-graduation, Bachelor degree recipients only	Career Services
D.1.1	MSU will increasingly attract and retain faculty of national and internationa l recognition.	Tenure-Track/ Tenured Faculty	Count of tenurable and tenured faculty on payroll each October	Planning and Analysis, Employee snapshot, MSU Banner data
		Faculty w Natl/Intl Refereed Scholarly Products	Count of faculty reporting in Activity insight one or more refereed scholarly (research and creative) products in national or international audience venues	Planning and Analysis, Faculty self-report in Activity Insight/annual report
		Academic Analytics Avg Fac Percentile	Institutional average percentile of tenurable faculty members within their home discipline based on Academic Analytics default weighting of publications, grants, and awards.	Academic Analytics
D.1.2	National and international recognition of MSU faculty as measured through Natl and Intl Awards and Honors		Count of faculty reporting national and international awards and honors in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
D.1.3	Rank within Carnegie R1 (Formerly RU/VH)			
	STEM R&D Expenditures (NSF)		NSF HERD from most recent year available, MSU data reported to NSF by Office of Sponsored programs	NSF HERD
	Rank		Imputed	Planning and Analysis
	Non-STEM R&D Expenditures (NSF)		NSF HERD from most recent year available, MSU data reported to NSF by Office of Sponsored programs	NSF HERD
	Rank		Imputed	Planning and Analysis
	Science and engineering post docs and non-fac research staff (NSF)		NSF GSS from most recent year available, MSU data reported to GSS by OPA and departments	NSF GSS
	Postdocs/Non-Faculty Researchers (w/ Doctorates)		NSF GSS from most recent year available, MSU data reported to GSS by OPA and departments	NSF GSS
	Rank		Imputed	Planning and Analysis
	Doctoral Conferrals (IPEDS)		IPEDS count of doctoral degrees awarded annually (Summer, Fall, Spring), MSU data reported to IPEDS by OPA	IPEDS
	Rank		Imputed	Planning and Analysis
D.2.1	Funding for capital projects from public and private		Expenditures in support of capital improvements	AVP for Financial Services

D.2.2	Grant-sponsored investment in centers, core facilities and resources (annual amt, cumulative assessment)		Grant funded expenditures in support of capital improvements related to scholarly work	Office of Sponsored Programs
D.3.1	Percentage of faculty who advise doctoral students (T/TT/NTT)		Percent of faculty with doctoral committee chair assignments recorded in Banner and extracted to Activity Insight	Graduate School, Planning and Analysis
D.3.2	Graduate student headcount		Headcount of students with STU_LEVL = GR	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
	Doctoral student headcount		Headcount of students with STU_CAT = GD	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
D.3.3	Graduate Degrees Awarded		Count of graduate certificates, masters, specialist and doctoral degrees awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
	STEM Masters and Doc Degrees Awarded		Count of graduate certificates, masters, specialist and doctoral degrees awarded annually (Summer, Fall, Spring) within MSU defined STEM CIP codes (broad definition)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
	All Doctoral Degrees Awarded		Count of doctoral degrees awarded annually (Summer, Fall, Spring)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
D.3.4	The number of faculty scholarly products co-authored/presented with graduate students		Count of faculty reporting scholarly products with co-author/-presenter identified as graduate student in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
E.1.1	Campus-wide coordinating infrastructure to support and advance engagement, outreach and service		Presence/absence of offices and committee structures to support and advance E,O,S	Planning and Analysis
E.1.2	Percentage of students, faculty and staff involved in service, outreach	Students	Unduplicated counts of students tracked through OAE participating in sponsored service and engagement activities	Office of Activities and Engagement
		Faculty	Percent of faculty self-reporting professional and public service in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
		Staff	Not yet measured	
E.1.3	Number of MSU service, outreach, and engagemen	Students	Count of student/activity pairs tracked through OAE	Office of Activities and Engagement
		Faculty	Count of faculty self-reported professional and public service activities in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
		Staff	Not yet measured	
E.1.4	Percentage of students actively participating in student organizations		Count of registered student organization members over enrolled student headcount	Office of Activities and Engagement
E.2.1	Percentage of MSU students participating in cross-cultural study, work or service experiences, incorporating both academic preparation and post-experience reflection***		Initial years included count of students in select study abroad and international exchange programs, most recent year to include more tracked programs through Terra Dotta	Office of International Programs
E.3.1	Number of opportuniti es for leadership developmen t and	Students	Not yet measured	
		Faculty (CFE)	Count of programs offered through the Center for Faculty Excellence	Center for Faculty Excellence
		Staff (PDT)	Count of sessions offered designated as leadership development through HR Professional Development and Training	HR Professional Development & Training, Office of Planning and Analysis
E.3.2	Percentage of MSU students, faculty and staff participatin g in	Students	Not yet measured	
		Faculty	Count of faculty self-reporting leadership development training in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
		Staff	Count of employees attending HR PD&T sessions designated as leadership development through HR PD&T	HR Professional Development & Training, Office of Planning and Analysis
I.1.1	Substantial curricular experience that integrates learning, discovery and engagement		Progress on curricular reform	Planning and Analysis, Provost Office
I.1.2	Department role and scope documents will include substantial integration of learning, discovery and		Progress on role and scope reform	Planning and Analysis, Provost Office

I.1.3	Community-based research projects		Count of scholarly projects self-reported by faculty as including community-based participatory research in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
I.1.4	Faculty scholarly products with undergraduate and	UG	Count of faculty reporting scholarly products with co-author/-presenter identified as undergraduate student in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
		GR	Count of faculty reporting scholarly products with co-author/-presenter identified as graduate student in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
I.2.1	Students completing interdisciplinary programs	Interdisc Maj.	Count of students completing degree programs in designated majors identified by Planning Council	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
		Interdisc Min.	Count of students completing degree programs in designated minors identified by Planning Council	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
		2nd Maj/Deg or Min	Count of students completing degrees with more than one major, a minor, or two degrees	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
I.2.2	Interdisciplinary research and creative projects		Count of scholarly products self-reported by faculty as interdisciplinary in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
A.1.1	MT Undergrad Headcount Enrollment (Fall)		Headcount enrollment of students with Montana Resident tuition status	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.2	New Transfer Students (Summer and Fall)		Headcount enrollment of students admitted as transfers in summer and fall terms	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.3	Graduate Student Headcount Enrollment (Fall)		Headcount of students with STU_CAT = GD	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.4	Online Credits (AY)		Count of student credit hours in course sections designated as online (90%+ online material)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.4	Online Courses (AY)		Count of distinct courses (unduplicated for multiple section or repeated courses) designated as online (90%+ online material)	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.5	Gallatin College Headcount Enrollment (Fall)		Headcount enrollment of students enrolled in Gallatin College degree and certificate programs , excluding developmental education	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.1.6	% Financial Need Met		Common Data Set, H2i, percent of need met for full-time undergrads	Office of Financial Aid Services
A.1.7	Total Headcount Enrollment (Fall)		Headcount enrollment of students	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.2.1	Native American Student Headcount Enrollment (Fall)		Headcount enrollment of students who identify as American Indian/Alaska Native with or without other race and ethnicity identifications	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.2.2	Other Under-Represented Ethnicity and Race Headcount Enrollment (Fall)		Headcount enrollment of students who identify as Hispanic, African American, Asian American, Pacific Islander/Native Hawaiian or multi-racial	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.2.3	International Student Headcount Enrollment (Fall)		Headcount enrollment of students who are not US citizens or permanent residents	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
A.2.4	Non-Traditional Age Student Headcount Enrollment (Fall)		Headcount of undergraduate students who are 24 years old or older as time of Fall census	Planning and Analysis, OCHE Student Data Warehouse, MSU Banner data
S.1.1	Increase the average MSU staff salary compared to		Not yet measured	
	Increase the average MSU staff salary compared to peer market (professional; surveyed positions changed in FY13, FY15)		Mean percent of peer mean for reported staff positions to CUPA HR professional salary survey, includes professional and some classified positions in mid-level offices, compared to all doctoral participants	Planning and Analysis, Employee Snapshot, MSU Banner data, CUPA HR Annual Staff Salary Survey

S.1.2	Increase the average MSU faculty salary compared to peer market (R1)		Mean percent of peer mean for full-time faculty positions by rank and discipline reported to Oklahoma State University Faculty Salary Survey, compared to RVH/R1 Universities	Planning and Analysis, Employee Snapshot, MSU Banner data, OSU Faculty Salary Survey
	Increase the average MSU administrative salary compared to peer market (surveyed positions changed in FY13)		Mean percent of peer mean for reported administrative positions to CUPA HR executive salary survey, compared to all doctoral participants	Planning and Analysis, Employee Snapshot, MSU Banner data, CUPA HR Annual Administrative Salary Survey
S.1.3	Faculty and staff participation in professional development opportunities will increase	CFE (events/ attendees)	Count of events presented by the Center for Faculty Excellence	Center for faculty Excellence
			Duplicated count of number of attendees	Center for faculty Excellence
		PDT (events/ attendees)	Count of events presented by HR Professional Development and Training	HR Professional Development & Training
			Duplicated count of number of attendees	HR Professional Development & Training
		Fac Self Report (AI - activities)	Count of faculty self-reporting professional development training in Activity Insight	Planning and Analysis, Faculty self-report in Activity Insight/annual report
S.2.1				
	% of classrooms with technology rated tier 3 or above		Percent of classrooms inventoried by Classroom Committee, University Information Technology and Campus Planning, Design, and Construction meeting definition for tier 3 or 4 technology	Campus Planning, Design, and Construction
	% of classrooms with technology rated tier 2		Percent of classrooms inventoried by Classroom Committee, University Information Technology and Campus Planning, Design, and Construction meeting definition for tier 2 technology	Campus Planning, Design, and Construction
S.2.2	Increase accessibility to campus facilities	Projects	Number of projects with ADA impacts	Campus Planning, Design, and Construction
		Cost	Dollar amount designated as creating ADA improvements, subset of total project costs	Campus Planning, Design, and Construction
S.2.3	Develop and implement a comprehensive master plan		Presence/absence of comprehensive master plan	Planning and Analysis
S.3.1	Budgeting processes will reflect alignment with the MSU strategic plan		Progress on policy and process to align budgeting with Strategic Plan	VP Administration and Finance, Planning and Analysis
S.3.2	Improved efficiency and effectiveness of mission support processes		Open MSU metrics for efficiency and effectiveness	Open MSU Steering and Assessment Committees
S.3.3	Fiscal resources in support of the MSU Strategic Plan		Fiscal resources, all sources	VP Administration and Finance, MSU Alumni Foundation, VP Research and Economic Development, Planning and Analysis
S.4.1	Greenhouse Gas Emissions (MT)		Climate Action Plan metric	Facilities Services
S.4.2	Diverted waste from landfill		Climate Action Plan metric	Office of Sustainability

Appendix D

Examples of Academic and Core 2.0 Program Assessment

2017 Assessment Results of Animal Science Majors

Department of Animal and Range Sciences

Dr. Tim DelCurto and Dr. Jan Bowman

In the spring of 2017, the Faculty of the Animal Science major met to formulate a plan to assess the program. This document is a report of our findings.

Methods:

After the curriculum mapping exercise, we chose to assess learning outcome #1, Knowledge, in ANSC 434 Beef Cattle Management (Fall semester 2016); and learning outcome #2, Critical Thinking, in ANSC 316 Meat Science (Spring semester 2017). We randomly selected student writing assignments to assess; 9 of the "Semester Project Scenario" assignment from ANSC 434, and 11 of the "Analysis of Food Intake" from ANSC 316. One assignment from ANSC 316 was excluded from consideration as the student had plagiarized and was given a zero on the assignment by the instructor. We used rubrics from FIU for Assessment of Subject Content Knowledge (for ANSC 434), and Assessment of Critical Thinking (for ANSC 316). These rubrics were modified to a scale from 1-3 (Appendices A & B). An average score that was below a 2 was considered not "Acceptable," and any average score of 2 or above was considered "Acceptable."

Results:

The results of our assessment are presented in Table 1. On the selected assignment, 89% of the students in ANSC 434 were considered acceptable for knowledge. This was slightly above our expected rate of 80%. On the selected assignment, 90% of the students in ANSC 316 were acceptable for critical thinking, which was also above our minimum level.

We identified some common mistakes related to our student's skills:

1. Students did not identify and respond completely to specific assignment requirements.
2. Students did not properly cite sources.
3. Students were not able to identify credible sources of information.
4. Students were not familiar with journal manuscript style or format.
5. Students were not able to put researched information into their own words.

We also identified some possible solutions:

1. Incorporate more writing assignments in Animal Science courses.
2. Provide example papers, grading rubrics and the common mistakes of most papers.
3. We need to do a better job of articulating the assignment expectations and standards.

Future Assessment Considerations:

We felt that the specific assignments selected for assessment did not adequately fit the program learning outcomes. Future assessments need to be more purposeful when selecting assignments.

Annual Assessment Report

Academic Year: 2016-2017

Department: Plant Sciences & Plant Pathology

Program(s): Plant Biology Degree Option

Assessment reports are to be submitted annually to report assessment activities and results by program. The reports are due every summer with a deadline of September 15th each year.

The use of this template is entirely optional.

Note: These reports have been required by MSU policy since 2004.

1. What Was Done

1. A learning-assessment committee was formed during Spring Semester, 2017, which comprises PSPP faculty members Andreas Fischer, Matt Lavin, Chaofu Lu. Committee members teach courses required of Plant Biology degree option majors.

2. This committee met during April 2107. Because of the diverse nature of students majoring in Plant Biology (e.g., medicinal herbalists, bee keepers, Fish & Wildlife students), the committee settled with three general learning outcomes:
Program Learning Outcomes. Graduates of this program will demonstrate:
1. Knowledge and skill required to be successful in their field
2. An ability to communicate effectively
3. An ability to design experiments and analyze data

3. The Committed assessed student performance in three required courses in the Plant Biology option, BIOO 220 (General Botany), BIO433 (Plant Physiology), and BIOB 490R (Independent Research). Of these three, BIOO 220 was formally assessed for learning outcomes 1 & 2 at the introductory level and BIOB 490R for learning outcomes 1-3 at the mastery level.

2. What Data Were Collected

1. For BIOO 220, General Botany, the committee reviewed interactions of two Plant Biology students with faculty and performance on exams taken in this course during Fall 2016. The two students in question were well known by the committee members.

2. For BIOB 490R, Independent Research, the committee reviewed research reports written by three individual Plant Biology student who were enrolled in this course during Fall 2016. The three students in question were very well known by the committee members.

3. What Was Learned

1. BIOO 220. The Plant Biology students in BIOO 220 demonstrated in- and outside-classroom engagement and an overall classroom performance that demonstrated a knowledge of plant physiology, morphology, and ecology. They have the knowledge, skill, and communication abilities required to be successful in Plant Biology at least at an introductory level.

2. BIOO 490R. The Written Communication Skills Rubric contained three evaluation categories, Structure, Content, and Mechanics. These three categories involved scorings of 1-4, with 4 including criteria that indicated the best outcome. The three student consistently scored 4, with only one exception. Our assessment is that these students can clearly organize a scientific paper into the

Introduction, Methods and Materials, Results, and Discussion, while incorporating references into all but the Results section. The research reports and follow up revisions, including verbal discussions, demonstrated that these Plant Biology students have 1) the knowledge and skill required to be successful in their field, 2) the ability to communicate effectively, and 3) the ability to design experiments and analyze data. All three outcomes were determined to be at the level of mastery.

4. How We Responded

1. Our assessment indicated that no changes are needed regarding learning outcomes 1-3.

2. We will instill in Plant Biology students early during their career the need to garner outside-of-the-classroom experience so that they graduate with the research experience necessary to demonstrate a mastery level in the three learning outcomes, especially regarding 2 and 3, effective communication and the ability to design experiments and analyze data (outcome 1 is implicit in outcomes 2 and 3).

Annual Assessment Report

Academic Year: 2016-2017
Department: Jake Jabs College of Business & Entrepreneurship
Program(s): B.S. Business

1. What Was Done

The College assessed four of the College's learning outcomes:

- Knowledge of business
- Oral communication
- Quantitative skills

2. What Data Were Collected

Knowledge of Business

The Major Field Test in Business was administered to 221 students in the senior seminar, BGEN 499, between the fall 2016 and spring 2017 semesters. Only two students registered for the course did not take the test due to schedule conflicts.

Oral Communication

Using the College's oral communication rubric, coaches in the College's Bracken Business Communications Clinic observed a total of 151 seniors in 41 teams in the senior seminar, BGEN 499, in spring 2017. The observers collected data on both team and individual presentation skills. Students' oral presentation skills were rated as below expectations, meets expectations or exceeds expectations on each of several measures:

Team assessments:

- organization of presentation (introduction, body, conclusion)
- visual aids
- team dynamics

Individual speaker quality assessments:

- vocalics
- eye contact
- kinesics
- dress

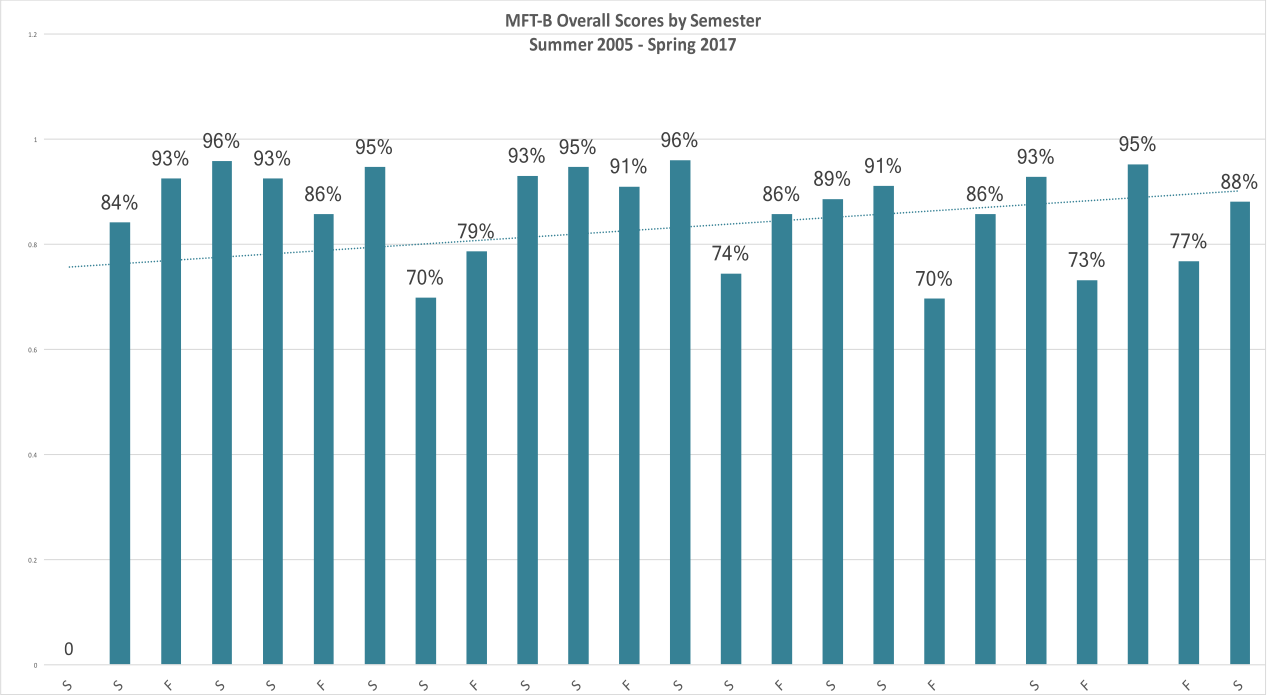
Quantitative Skills

Using the College's in-house developed quantitative skills tests, the College administered the tests in the senior seminar, BGEN 499, in spring 2017. 74 randomly selected students took the test on statistics and managerial accounting skills, while 74 students took the test on finance and financial accounting skills. Nine students in the course did not take the test.

3. What Was Learned

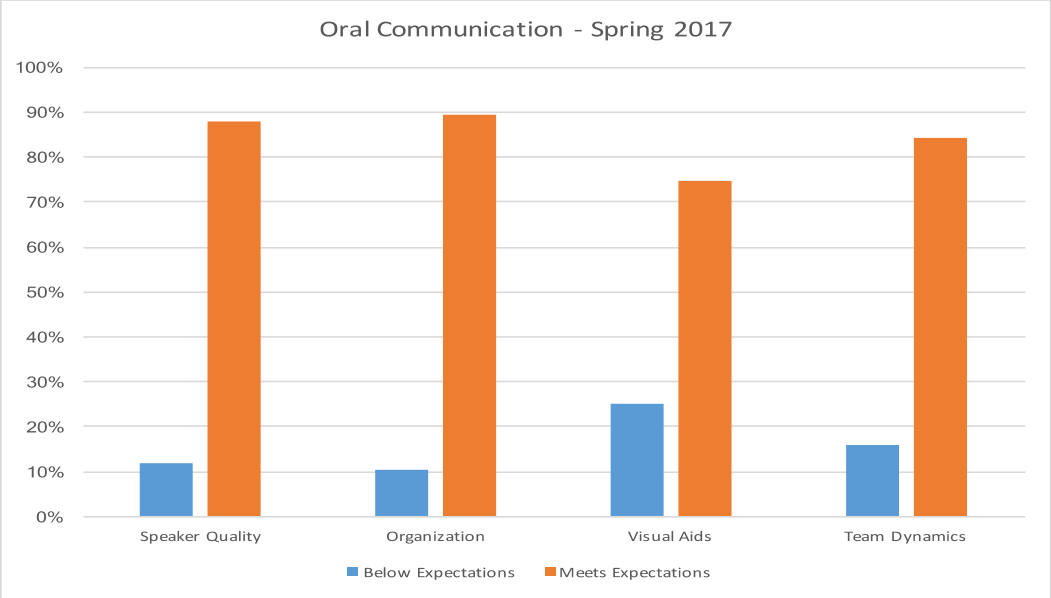
Knowledge of Business

In fall 2016, 72% of institutions administering the MFT scored below the College's cohort. In spring 2017, 85% scored below our cohort. While the scores in fall 2016 and spring 2017 were lower than in prior semesters, the upward trend in scores has continued. Our research suggests that the fluctuation in scores appears to be more related to the aptitudes of the students in a given cohort rather than to teaching activities in the College.



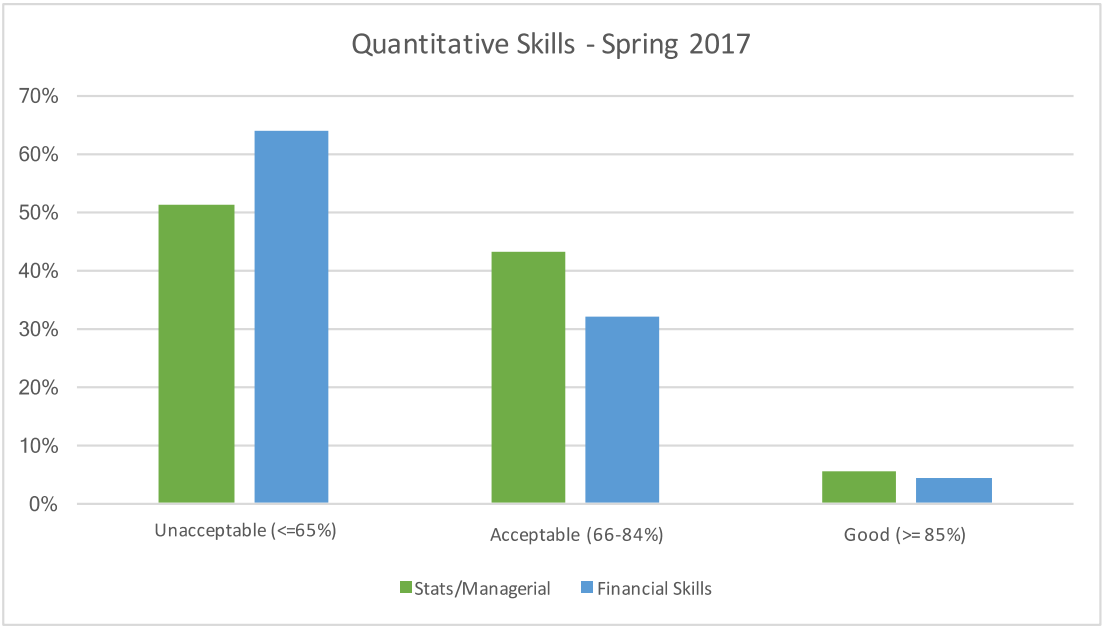
Oral Communication

For each of the categories – speaker quality, organization, visual aids, and team dynamics – most students meet or exceeded expectations. The College's goal is that 75% of students meet or exceed expectations. Individually and in groups, students met that goal.



Quantitative Skills

2017 was the second time the College administered its own test of quantitative skills; spring 2015 was the first time the test was administered. Until 2015 the College had used the quantitative skills sub-scores on the Major Field Test, on which our students as a cohort have consistently scored at or above the 90th percentile. The College wanted to gain clearer insight into student mastery of the quantitative skills the College most values in its graduates, however, which led the College to create its own tests. The results show that our students have not mastered key quantitative skills. Only 49% of students scored in the acceptable or good range for statistics and managerial accounting, and only 36% scored in that range for finance and financial accounting. Thus, the College is not meeting its goal that 75% of students score in the acceptable or good range.



4. How We Responded

Knowledge of Business

The MFT results suggest that the College does not need to make any significant changes to the curriculum with respect to knowledge of business.

Oral Communication

The oral communication results suggest that the College does not need to make any significant changes to the curriculum with respect to developing oral communication skills in our students.

Quantitative Skills

During 2017-2018 the College's Academic Programs Committee will study and make recommendations to the faculty on ways to improve students' quantitative skills. While our students' scores were below the College's goal, there was a slight improvement in the scores compared to the last time the test was administered.

	Stats/Managerial		Financial	
	Spring 2015	Spring 2017	Spring 2015	Spring 2017
Acceptable + Good	31%	49%	35%	36%
Unacceptable	69%	51%	65%	64%

Some of the change in scores may be due to the way the test was administered (asynchronous online vs. in-person and online), there may be some improvements in students' retention of the quantitative skills. When the College beta-tested its new quantitative skills tests in 2014 students were asked for their reactions after taking the test. The most common comment was that "I knew how to do this two years ago but I haven't used this skill since." However, as the College has not met its goal that 75% of students score in the acceptable or good range, the results suggest that more work needs to be done in the curriculum to embed these key skills throughout the curriculum and especially in upper level courses.

Assessment report for the 2016/2017 academic year
Department of Chemistry and Biochemistry

Prepared by: Prof. Mary Cloninger, Head of the Department
May 25, 2017

During the 2016/2017 academic year, the assessment that was performed in the Department of Chemistry and Biochemistry was focused on learning outcomes 1, 2, 3, 5, 6, and 7. For learning outcomes 1, 2, and 6, the students' proficiencies were evaluated during their CHMY 494 and BCH 494 capstone seminar courses. For learning outcomes 3, 5, and 7, the American Chemical Society (ACS) standardized subject exams in organic, analytical, and physical chemistry were administered. Learning outcome 4 and part of learning outcome 3 will be assessed by administering the biochemistry and physical chemistry ACS subject exams during the 2017/2018 academic year. Assessment for learning outcome 8 was assessed using the endorsement data for high school teacher certifications in all previous years and will be assessed again during the 2017/18 academic year.

Overall Summary
All of the learning objectives are being met programmatically, indicating that this is a strong and successfully program for chemistry and biochemistry majors when compared to other programs in the United States.

(1) Learning Outcome 1
Professional, biochemistry, and teaching options: Students will be able to clearly communicate research findings in an oral presentation and poster session format.

Assessment for Learning Outcome 1
Twenty-five senior-level undergraduate students were evaluated for clarity and depth of oral presentation during a 25 minute PowerPoint presentation to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2017. All of the students successfully communicated their research findings in both formats.

(2) Learning Outcome 2
Professional, biochemistry, and teaching options: Students will be able to solve problems related to chemistry and biochemistry.

Assessment for Learning Outcome 2
The ability of twenty-five senior-level undergraduate students to comprehensively solve problems related to chemistry and biochemistry were evaluated during their 25 minute oral PowerPoint presentations to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2017. All students mastered the problem solving learning objective as demonstrated by their presentation of the progress that they were able to make and then describe for their research projects.

(3 and 7) Learning Outcomes 3 and 7
Professional and teaching options:
Students will have a broad knowledge required in organic, inorganic, physical and analytical chemistry as well as in biochemistry.

Assessment for Learning Outcomes 3 and 7
Organic and Analytical areas were assessed for all majors.

Twenty-five majors in CHMY 323 and CHMY 333 took the ACS organic subject exam (2012) as the final exam for their course. The average score for this cohort placed them at the 60th percentile nationally (39.3/70), with a median score at the 58th percentile (38/70). Only seven of the students scored below the 40th percentile in terms of national results. Thus, this component of the learning objectives was well met.

Forty-one students in CHMY 311 took the 2013 ACS analytical chemistry subject exam as the final exam for their course. The national average on that 50-question exam is 26/50 (this is 50th percentile). Our class average was 33/50, which puts the MSU students in the 81st percentile nationally. For analytical chemistry, our students are well above the national average overall. This course was taught in the TEAL classroom.

The inorganic chemistry, physical chemistry, and biochemistry component of this learning outcome was not assessed during the 2016/2017 academic year for the professional option.

(4) Learning Outcome 4
Biochemistry option:
Students will have a solid foundation in all aspects of biochemistry.

Assessment for Learning Outcome 4
This Learning Outcome was not assessed during the 2016/2017 academic year.

(5) Learning Outcome 5
Biochemistry option:
Students will be able to apply mathematical tools and computational methods to biochemical problems.

Assessment for Learning Outcome 5
Fifteen majors with the biochemistry option took the ACS physical chemistry comprehensive subject exam during CHMY 361. However, they were given 50 minutes rather than 110, so the national norms are not particularly helpful. The average score for this cohort (23.1/60) placed them at the 20th percentile nationally, with a median score (24/60) that placed them at the 23rd percentile. Since this exam is meant for professional option students who have had two courses in physical chemistry (CHMY 371 and CHMY 373), and is meant to be given during 110 minutes rather than 50 minutes, these scores indicate that this learning objective is being met very well by our curriculum. The point for our majors was to assess the ability to apply mathematical tools and computational methods to biochemical problems, and this was accomplished well.

(6) Learning Outcome 6
Biochemistry option:
Students will understand the problems in another biological science (e.g., microbiology, cell biology, neuroscience, plant or animal science) that biochemical techniques help solve.

Assessment for Learning Outcome 6

Twenty-five senior undergraduate students were evaluated for clarity and depth of oral presentation during a 25 minute PowerPoint presentation to their peers in CHMY 494 and BCH 494 senior capstone seminar during the spring semester of 2017. All of the students demonstrated extremely high mastery of this learning option.

(8) Learning Outcome 8

Teaching option:
Students will develop instructional and pedagogical competence such that they meet state certification standards.

Assessment for Learning Outcome 8
This Learning Outcome was not assessed during the 2016/2017 academic year.

Overall Summary

All of the learning objectives that were tested during the 2016/2017 academic year were met programmatically, indicating that this is a strong and successfully program for chemistry and biochemistry majors when compared to other programs in the United States.

Gallatin College

Associate of Applied Science (AAS) in Photonics and Laser Technology

Photonics & Laser Technology Program Outcomes:

1. Graduates will obtain the necessary knowledge required to be successful in the optics, laser, and photonics support field. Students will be exposed to laser systems, electronics, optics and electro-optics. In particular, graduates will be prepared for a variety of Photonics based careers in design and manufacturing, materials processing, communications, medical applications, semiconductor fabrication, optical systems, electronics, military applications, sales, and education.
2. Graduates will have a foundation in electronics that includes electronic components and circuitry knowledge base.
3. Graduates will be able to function in a professional manner in their field, and use, maintain and clean equipment and tools required in the field of electronics, optics, lasers, and photonics.
4. Graduates will have knowledge of the following optics intensive components / theory:
    - Nature of Light
    - Geometric Optics
    - Wave Optics
    - Optical Components
    - Optical Devices and Principal of Operation
    - Optical Support and Positioning Equipment
    - Fibers and Fiber Optics (including connectorizing, polishing, and fusion splicing)
    - Physics of Lasers and Laser Operation
    - Operation and Characterization of Advanced Laser Systems such as Solid State Lasers and Fiber Lasers (and others)
    - Optical and Electro-Optical Systems for Precision Measurements and Alignments
    - Systems Integration of complex Photonics based Electro-Optic Systems
    - AC, DC, Digital, and Analog Electronics for support of advanced Photonics Systems
5. Graduates will be able to analyze, configure, test, measure, troubleshoot and assist with problems that arise in a professional optics, lasers, and photonics environment.
6. Graduates will be able to communicate technical ideas, procedures, and results with professionals in written, oral, and graphic format.

Program Outcome Assessment Schedule:

	Year					
Outcome	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2021-2022**	**2022-2023**
1	x			X		
2	x			X		
3		X			X	
4		X			X	
5			X			x
6			X			X

1. What Was Done

Based on our assessment plan, we assessed learning outcomes 1 & 2 this year:

1. Graduates will obtain the necessary knowledge required to be successful in the optics, laser, and photonics support field. Students will be exposed to laser systems, electronics, optics and electro-optics. In particular, graduates will be prepared for a variety of Photonics based careers in design and manufacturing, materials processing, communications, medical applications, semiconductor fabrication, optical systems, electronics, military applications, sales, and education.

2. Graduates will have a foundation in electronics that includes electronic components and circuitry knowledge base.

2016-2017 Outcomes Reviewed:

CNC Machine Technology - CAS		**Program Outcomes**	
Course	**Cr**	**1**	**2**
ETEC 101 – AC/DC Electronics with Lab	4	I	D
ETEC 106 – AC Circuit Analysis	3	I	D
PLTT 101 – Fundamentals of Light & Lasers	5	I	D

Performance Thresholds:

I: Introductory Level		**D: Developing Level**		**M: Mastery Level**	
Knowledge	**Comprehension**	**Application**	**Analysis**	**Synthesis**	**Evaluation**
Defines	Comprehends	Applies	Analyzes	Categorizes	Concludes
Describes	Distinguishes	Computes	Compares	Composes	Critiques
Identifies	Interprets	Demonstrates	Contrasts	Creates	Defends
Knows	Summarizes	Prepares	Distinguishes	Devises	Evaluates
Lists		Solves		Designs	Interprets
Recognizes				Modifies	Justifies

2. What Data Were Collected

Student results from the following:

- ETEC101 Exam 6
- ETEC 101 Lab Manual
- ETEC 101 Final Exam
- ETEC 106 Lab Manual
- PLTT 101 Final Exam

3. What Was Learned

This is the first year of the Photonics & Laser Technology program at Gallatin College and therefore only the first year courses were taught. Next year, the second year courses will be added to the assessment plan as well as additional outcomes. These annual assessments will evolve considerably as the program builds.

The assessments from these first year classes show promising results of students' performance and meeting of program outcomes. Initial assessment reveals the outcomes themselves may need to be rewritten to be clearer and more measurable. Outcome 1, in particular is too long and reads more as an overall program goal and should be broken down to individual outcomes. This will be rewritten next year.

The AC/DC course really should be an intro to AC only and not incorporate DC. It will be consider if this can be a title change through the CCN next year.

4. How We Responded

Next year, the second year courses will be added to the assessment plan as well as additional outcomes. These annual assessments will evolve considerably as the program builds.

Outcome 1, will be rewritten next year to read as a measurable outcome more than an overall program goal.

The AC/DC course will pursue a title change through the CCN next year.

The Department of Chemistry and Biochemistry
Assessment Report– PhD Programs- Fall 2015-
Prepared by Mary Cloninger and Doreen Brown

MSU's Mission

Montana State University, the state's land grant institution, educates students, creates knowledge and art, and serves communities by integrating learning, discovery and engagement.

The Department of Chemistry and Biochemistry Mission

The mission of the Department of Chemistry and Biochemistry is to provide students with educational experiences that empower and guide them to think critically and creatively for long term professional success in their chosen fields.

The following assessment report highlights the Department of Chemistry and Biochemistry's Ph.D. programs in chemistry and biochemistry based on data from 2013, 2014 and 2015. The report begins with facts about the program in the last 3 years and then presents information on the Department's and the Graduate School's requirements. Data on Ph.D. learning outcomes are also presented.

Facts about the Program

- 74 graduate students were enrolled in Fall of 2013.
- 68 graduate students were enrolled in the Fall of 2014
- 67 graduate students are enrolled in the Fall of 2015.

Table 1 below provides the number of graduate students in the program in the Fall of 2015 based on their entering class year. Of the current total, 6 students are on either a thesis or coursework (CW) Master (MS) track. All other students are pursuing a Ph.D. in chemistry or biochemistry.

Table 1 – Current Students in the Department According to Entering Year

2015	2014	2013	2012	2011	2010	2009	2008
10	11	14	12	11	7	1	1

Low attrition rate for the past 3 entering classes:

- Of the 20 students that entered in Fall of 2012, 2 students did not pass the qualifying exams and left the program. One student transferred to medical school, one student received a CW MS and 2 students transferred to the newly created Materials Science Program at MSU.
- In the entering class of 2013 (14 students), ten students are pursuing PhD degrees and 4 students changed to the MS programs.
- In the entering class of 2014, 10 students remain in the PhD program (1 person left).

1. **Qualifying Exams**

All first year students take qualifying exams (proficiencies) a department requirement, to demonstrate their preparedness for an advanced degree in our programs. Students are required to pass 3 proficiency exams in their first year of graduate school to remain in good standing with

the department. The exams are offered 4 times a year and except for the structural and molecular biology exam, all exams are standardized American Chemistry Society (ACS) exams given in 5 different sub-disciplines. As graded in the past two years, the outcome for any exam can be a Full Pass (FP) Master Pass (MP) or a No Pass (NP). As determined by ACS norms for most tests, a FP is set at the 55^{th} percentile, the MP is set at ~ 50^{th} percentile and scores below the 50^{th} percentile are considered a NP. The names and results of each student who took proficiencies in the entering classes of 2013, and 2014 appear in Appendix A. We provided the first round of results from students in the entering class of 2015.

Results:

Entering Class of 2013- Of the 14 students that entered the Ph.D. program in 2013, all students passed their proficiency requirement in their first year of graduate school for a **100% success rate**. One student who transferred into the program did not have to take the qualifying exams.

Entering Class of 2014- Of the 11 students that entered the Ph.D. program in the Fall of 2014, all students passed their proficiency requirement during their first year of graduate school for a **100% success rate**.

Entering Class of 2015 – Of the 9 students taking the proficiency exams, 2 student have the met the department requirement of passing 3 exams. Three students have 2 full passes, and the remaining 5 students have 1 full pass or none.

2. Comprehensive Exams

The Graduate School requires a comprehensive exam after 2/3 of a student's coursework has been completed. Typically our department has students defend written and oral portions of the exam (at the same time) during the student's second semester of their second year of graduate school provided they are in good standing. See Appendix B for names of those students who took the exam in 2013/2014, and 2014/2015. A summary of the results are below.

Nine students that were in good standing from the class of 2013 successfully defended their written and oral comprehensive exams. Four students in the class of 2013 changed from a PhD track to an MS route and were not required to take the exam. One student successfully defended his MS and has remained en-route to a Ph.D. in chemistry. He will take his comprehensive exam in the Fall of 2015.

Eleven students from the entering class of 2014 are in good standing and are poised to complete the comprehensive exam requirement in Spring of 2016.

3. Department Requirement- 4^{th} year seminar

The Department of Chemistry and Biochemistry requires that all students in their 4^{th} year of graduate school give a public research seminar. The students meet with their Ph.D. committees after the seminar to discuss relevant research questions and to provide feedback on progress and time of expected graduation. It is expected that the student will graduate with their degree ~ 1-2

years after they give their seminar. The names of the students who completed this requirement in 2013, and 2014 appear below and if they graduated the year they graduated in parentheses.

2013
John Kirtley (2015)
Michelle Tigges (2015)
Krista Shisler
Kevin Swanson (2014)
2014
Jessica Ennist
Eric Gobrogge (Dec.2015)
Tim Hamerly
Paul Jordan
Brooks Marshall
Charlie Stark
Alan Weaver

4. Graduation

Table 2 summarizes our graduation statistics for the last 7 years. Included in Table 2 are the numbers of credits, average GPA and average number of years the students took to graduate with either an MS or Ph.D. The names of students who graduated in the 2013, 2014 and currently from 2015 appear in Appendix C.

Table 2- Graduation Statistics

Degree	N	Average Credits	Average GPA	Average #yrs to graduate
		2009		
MS	4	42.5	3.51	2.8
PhD	7	76.3	3.7	5.7
		2010		
MS	3	38	3.67	3
PhD	8	80.5	3.75	5.4
		2011		
MS	7	47.85	3.55	3.7
PhD	4	72.5	3.74	5
		2012		
MS	6	39.5	3.46	3.3
PhD	6	78.33	3.7	5.7
		2013		
MS	4	45.25	3.66	3.5
PhD	8	85.15	3.72	6.3
		2014		
MS	1	47	3.55	4
PhD	13	69.91	3.59	5.8
		2015		
MS	2	33.0	3.42	2.5
PhD	13	69.13	3.75	5.7

Program Learning Outcomes as Presented in 2014

For doctoral students:

1. Demonstrate mastery of subject content knowledge.
2. Demonstrate effective oral and written communication skills.
3. Conduct independent research and analysis in their disciple and contribute original and substantive work in their field.
4. Demonstrate independent scientific thinking and advanced knowledge in their current discipline and in related areas of their discipline.
5. Demonstrate knowledge of basic lab safety and the requirements to assist in establishing a safe lab environment.
6. Understand ethical issues and responsibilities especially in matters related to professionalism, data collection, the laboratory setting and in writing and publishing theses, dissertations and scientific papers.
7. Professionalization into the field of study: publications, presentations, attended conferences, received funded fellowships, and professional association activities.

Program Learning Outcomes 1-4;
Fall 2014-Summer 2015 only

We created a rubric (Appendix D) to evaluate learning outcomes 1-4. For ease, in the assessing outcomes, 1, 3 and 4 were combined to evaluate the student. We evaluated the student separately on written and oral communication skills.

In the Fall of 2014, we began to distribute the rubric to 3 faculty members on a student's committee at the student's Ph.D. defense. We did not evaluate students who took their comprehensive exams during Fall/Spring '14/'15 as we were refining the rubric. We will begin to have results on comprehensive exams at the end of spring 2016. The overall scores for each of the outcomes assessed were averaged for each student. For each learning outcome, an average score of 1 was unacceptable; 2 was acceptable and 3 exceptional. Data were collected on 14 students.

On the outcome "the student has effective oral communication skills", 100% of our students averaged a score of 2 (acceptable) or better. On the outcome "the student has effective written communication skills, 12 students averaged a 2 (acceptable) or better and 2 students averaged below a 2 on this outcome. On the combined outcomes of 1,3 and 4 "the student demonstrated mastery of subject content and successfully conducted independent research and analysis contributing original substantive work in their field" 13 students averaged a 2 (acceptable) or better. One student averaged a 1.5 on this outcome.
All 14 students earned a Ph.D. in chemistry or biochemistry.

Program Learning Outcomes 5 and 6;

All entering students (AY 2013-2014, 2014-2015 and AY 2015-16 (n=35) have completed ethics training with either the Graduate School and/or the Department of Chemistry and Biochemistry. For the past 3 years, during orientation for the first year graduate students, Professor Mary Cloninger has presented an ethics in research module for all incoming graduate students. In addition to this classroom time, students have completed an online training certification through the Collaborative Institutional Training Initiative (CITI) offered through the University of Miami (https://www.citiprogram.org/.) Students had to attend the classroom training session with Professor Marry Cloninger and pass the necessary CITI online training modules and quizzes in order to be a student in good standing in our department. We will continue this training every year for the new incoming graduate students. Last year (Fall 2014) our incoming students also had a training session in research compliance, ethics and legal issues with Justin Cook, Director from the Office of Research (MSU) during the Graduate School's orientation in August.

In the Fall of 2015, the department head implemented a mandatory fire safety training for all graduate students and TAs affiliated with the department. All 67 graduate students in the department of chemistry and biochemistry completed this (90 min) fire safety training session with Skip Hougland from MSU's Safety and Risk Management. In addition to mandatory fire safety training, all entering students for the past three years (n=35) participated in a 3-day teaching training orientation with Professor Chris Bahn. This training included a 45 minutes session on laboratory safety. All first year students in the department have to complete an online laboratory safety course through Safety and Risk Management in order to be in good standing with the department. This training will continue forward with every new entering graduate class.

Learning Outcome 7

For the learning outcome of "professionalization into the field of study: publications, presentations, attended conferences, received funded fellowships, and professional association activities, we initially thought that we would collect CVs from the students who obtained a Ph.D. from our department. While some students did email the graduate program director the information, multiple emails to students did not achieve the desired results. The Dean of the Graduate School strongly encouraged every department to file a progress report on every student in Spring of 2015. This form included a section on "progress in research" which addressed all the requirements of this learning outcome. We used this form and gleaned information from the CVs students gave us to assess learning outcome 7. From the data, 97 % of our Ph.D. students who graduated in 2013, 2014 and those in 2015, have demonstrated more than one form of professionalization in their field.

Conclusions

We are pleased with the results to date and strongly feel the program learning outcomes are being met for the Ph.D. programs in chemistry and biochemistry. Our initial threshold responses as decided in Fall of 2014 were the following.

- At least 80% of students will be ranked at a level 2 or 3 in subject content knowledge, written communication, and oral communication.
- At least 90% of students will pass their defense on their first attempt.
- 100% of students will successfully complete the ethics training and lab safety training.
- At least 95% of students will demonstrate more than one form of professionalization in their field.

Our data indicate we are well above the 80% of our students ranked at a level 2 or 3 in subject content knowledge, written communication, and oral communication skills. We had one student that did not pass his Ph.D. on the first try but 97% of our students did. 100% of our students have participated in fire safety training in the past year and 100% of our entering graduate student body in the past 3 years have completed ethics training. It is very likely that most of our students have participated in an ethics training but in 2013, we mandated that entering students had to have the training in orientation. Finally, 97% of our graduated Ph.D. students have demonstrated more than one form of professionalization in their field.

We will make changes to the following program learning outcomes to more accurately reflect our rubric. The collection of data methodology will remain the same except we will include the Graduate School's progress report form to assess student's professionalization.

For doctoral students the learning outcomes of the program are:

1. Demonstrate mastery of subject content knowledge, conduct independent research and analysis in their disciple and contribute original and substantive work in their field and demonstrate independent scientific thinking and advanced knowledge in their current discipline and in related areas of their discipline.
2. Demonstrate effective oral communication skills.
3. Demonstrate effective written communication skills.
4. Demonstrate knowledge of basic lab safety and the requirements to assist in establishing a safe lab environment.
5. Understand ethical issues and responsibilities especially in matters related to professionalism, data collection, the laboratory setting and in writing and publishing theses, dissertations and scientific papers.
6. Professionalization into the field of study: publications, presentations, attended conferences, received funded fellowships, and professional association activities.

From 1999-2005 the number of students that left the program without a degree was alarming. Attrition was extremely high (data not shown). It is clear from our graduation records (both in PhD.s and MS degrees) in the past 5 years our students are staying in the program and they are graduating with a degree (Table 2). We have more than doubled the number of graduating

students with Ph.D(s.) since 2012. In the Fall of 2015 we should have at least 3 more PhD defenses (and expect passes) surpassing last year's total number of graduating students with Ph.Ds.

Our students have made incredible contributions in science with papers in prestigious journals as Nature Chemistry, Nano Letters, The Journal of the Gesellschaft Deutscher Chemiker Angewandte Chemie and The Journal of American Chemistry Society. Our students continue to be awarded with Department of Energy, Department of Defense, NASA, National Science Foundation, the Naval Research Laboratory, American Heart Association and National Institutes of Health graduate student awards. Additionally, several students in the department have been awarded the Kopriva Graduate Student Award from the College of Letters and Science and have been awarded research performance awards newly created in 2015 from the Dean of the Graduate School. At least 2 students in the last 3 years from our entering classes have been awarded with Presidential and Merit Awards from the Graduate School.

We are excited about our programs in chemistry and biochemistry especially with the trend that students are staying in the program and graduating with Ph.D.s in less than 6 years. The data reveal the department is succeeding in reaching its mission to graduate students by providing them educational experiences that guide them for long term professional success. At this time, we are not making any major changes to our Ph.D. program in chemistry or biochemistry.

Academic Years: 2015–2016 & 2016–2017

Department: Ecology

Program : Ph.D. & M.S.

AY 2015–2016

1: Demonstrate a substantive breadth of knowledge of the field and sub-disciplines of ecology.

In AY 15–16 five Ph.D. students and seven M.S. students took their qualifying exam which focuses on broad ecological knowledge. All students passed without any recommended remedial coursework assignments or actions. In addition, nine students took BIOE 554 – Foundations of Ecology and Management – which emphasizes the breadth of the field of ecology. All nine students surpassed the minimum requirements on oral presentations and literature synthesis, exhibiting a successful demonstration of their breadth of knowledge of the field and sub-disciplines of ecology. However, student evaluations identified issues with changes in the structure and objectives of the course, and the course objectives and content were discusses extensively in faculty meetings. Consequently, the following year (AY 16–17) the course was reassigned to a new faculty member and the content was returned more to the original intent.

2: Demonstrate effective written and oral communication of scientific material, both from original and other sources.

In 2015–2016 eight M.S. students took their comprehensive exam (simultaneous to their thesis defense) and one Ph.D. student took their written & oral comprehensive exam. All exhibited effective written and oral communication of scientific material. In addition, in Spring 2016 eleven students took BIOE 555 – Communication in Ecological Sciences – and demonstrated effectiveness in oral presentations in multiple formats. Collectively, these data sources demonstrate effective effective written and oral communication of scientific material, both from original and other sources.

3. Conduct substantive original research and produce written and oral reports of the body of work.

In AY 2015–2016 eight M.S. students defended their thesis and one Ph.D. student defended their dissertation. All were successful, demonstrating their ability to conduct substantive original research and produce written and oral reports of the body of work.

4. Conduct scholarly and professional activities in an ethical manner.

Ethical behavior is assessed in the comprehensive exam and defense. All students taking their comprehensive exam or defending their dissertation exhibited good understanding of the ethical conduct of research. In addition, federally funded graduate students completed the CITI Responsible Conduct of Research training.

5. Contribute to the development of the field of ecology and/or scientifically based natural resource management.

In calendar year 2015 graduate students in the Ecology Department contributed to 20 refereed publications. Students in multiple labs presented papers or posters at meetings ranging from the Ecological Society of America to state Wildlife Society meetings.

Overall: In general the Ecology Department graduate program remains strong and productive. The Foundations of Ecology & Management and the Communications on Ecological Science courses are doing an excellent job in developing professional and speaking skills in graduate students, and the publication rate from the program is quite satisfactory.

AY 2016–2017

1: Demonstrate a substantive breadth of knowledge of the field and sub-disciplines of ecology.

In AY 2016–2017 seventeen graduate students took the Foundations of Ecology and Management course. All seventeen students surpassed the minimum requirements on oral presentations and literature synthesis, exhibiting a successful demonstration of their breadth of knowledge of the field and sub-disciplines of ecology. In response to the data-driven changes from 2015 the revised course received much higher student evaluations and interviews with graduate students reinforced much higher satisfaction with the revised course. In addition, nine M.S students and five Ph.D. took and passed their qualifying exam.

2: Demonstrate effective written and oral communication of scientific material, both from original and other sources.

In AY 2016–2017 seven M.S. students passed their comprehensive exam and successfully defended their thesis. In addition, one Ph.D. student took and passed their written & oral comprehensive exam. One Ph.D. student successfully defended their dissertation. In all cases, graduate students have shown impressive oral presentation skills at their defense, although their technical writing skills could be improved. Since we no at present have sufficient capability to offer a formal course in scientific writing the faculty have agreed to re-double their efforts in guiding thesis and dissertation preparation.

3. Conduct substantive original research and produce written and oral reports of the body of work.

As noted just above, graduate student oral presentations have greatly improved since the implementation of the Communication in Ecological Sciences course. Thesis and dissertation chapters often still need work, but students are then encouraged to re-write the chapters for publication, which greatly sharpens their writing skills.

4. Conduct scholarly and professional activities in an ethical manner.

Ethical behavior is assessed in the comprehensive exam and defense. All students taking their comprehensive exam or defending their dissertation exhibited good understanding of the ethical conduct of research. In addition, federally funded graduate students completed the CITI Responsible Conduct of Research training.

5. Contribute to the development of the field of ecology and/or scientifically based natural resource management.

In 2016 Ecology Department graduate students contributed to 31 refereed publications and numerous poster and oral presentations at national and international meetings.

Overall: We determined from the data that the graduate program within the department is quite strong and continues to function well. We corrected the one problem identified in the previous year and re-evaluated the role of the Communication in Ecological Science course as well. That course was determined to serve us very well.

Department of Mathematical Sciences
PhD Program Assessment 2013-2015

PhD Programs assessed: PhD in Mathematics
PhD in Statistics

1. **What was done on assessment this year?** AY 2013 - 2015

Each PhD program was reviewed according to our Program Assessment plan. The departmental Graduate Committee (henceforth, GPC) convened to deliberate the assessment results and determine if any program changes were needed.

2. **What assessment data were collected?**

Results from Comprehensive Exams (qualifying, written, oral and defense).

Students taking comprehensive exams in 2013-14 and 2014-15

Last 4 GID	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Results	Program
2580	W				Left Program	Math
5233	NP	NP		F	Changed Program	Math (Education)
1487		D			Graduated	Math (Education)
3915	O		D		Graduated	Math (Education)
3725		D			Graduated	Math (Education)
2769				D	Graduated	Math
2508				D	Graduated	Math
1400				D	Graduated	Math
0920		D			Graduated	Math
3119	O				Ongoing	Math
5232	W		O		Ongoing	Statistics
7049	O		D		Graduated	Statistics
2264	W	O		D	Graduated	Statistics
4706	*		W	O	Ongoing	Math (Education)
3175	*		W		Ongoing	Math (Education)
7350	*	*	W	O	Ongoing	Math (Education)
1844			*		Ongoing	Math
3309			*		Ongoing	Math
4207			*		Ongoing	Math
5630			*		Ongoing	Math
6103			*		Ongoing	Math
5705	O				Ongoing	Math
0611			W	O	Ongoing	Statistics
6589	W			O	Ongoing	Math
5738		O			Ongoing	Statistics
5656				O	Ongoing	Math

4387				Q	Ongoing	Statistics
9322				Q	Ongoing	Statistics

Symbol Key

* Student completed an attempt in one component of a multicomponent exam. Not counted as pass until all components completed.
W Passed Written Comprehensive Exam
O Passed Oral Comprehensive Exam
Q Passed Qualifying Comprehensive Exam
D Passed Defense
NP Student's first attempt was not passed
F Fail

Data Summary

Total number of students attempting PhD Math Exams: 21
Total number failing PhD Math Exams: 1

Total number of students attempting PhD Statistics Exams: 7
Total number failing PhD Statistics Exams: 0

3. **What was learned from the assessment?**

For the PhD in Statistics, the GPC verified that the requirements that (i) students take 3 credits of Stat 689: Doctoral Reading and Research prior to written comprehensive exam, and (ii) changes made to the written exam component structure several years ago continue to result in very high success rates within each cohort of Statistics PhD students. The changes in the exam structure were primarily modifying the exam to include questions related to the readings in Stat 689, reading and critiquing two new research papers in the student's research area, and performing a comprehensive data analysis problem that includes a written report. These exam components provide a good assessment and better reflect whether a student is prepared to perform independent doctoral research in Statistics.

For a number of years, the Mathematics PhD with a dissertation in mathematics education encouraged students to take the Reals-Complex exam for the content component of a trio of comprehensive exams. Evidence during this assessment period showed that Reals/Complex is not the most appropriate exam for this program because the content is not aligned with the research area of these students. We have revised program requirements as a result. The revised program maintains the standard of content rigor in terms of completing doctoral-level coursework, but now uses a written comprehensive examination in mathematics content that better reflects the needs of future mathematics education researchers and educators.

4. **How did you respond to the assessment results?**

For the PhD in Statistics, our response is to continue to use our current exam and defense procedures given the success we are enjoying in our completion rate for PhDs and providing current PhD students with a path to success.

For the PhD in Mathematics, we adjusted the requirements for the mathematics – education pathway as described above. We made no further changes for the PhD in mathematics.

MEMO

DATE: March 22, 2017

TO: Tamela Eitle, Associate Provost

FROM: Deb Blanchard & Carl Igo, US CORE Assessment Team Co-Chairs

SUBJECT: Fall 2016 University Seminar Critical Thinking Assessment Summary

During the fall 2016 semester, all University Seminar directors were tasked with assessing the Learning Outcome for critical thinking common to all US courses:

Demonstrate critical thinking abilities

Included with this cover are the critical thinking assessment evaluation instrument (the Association of American Colleges and Universities Critical Thinking VALUE Rubric), and the detailed reports for the following US CORE courses:

AGED 140US	*Leadership for Agribusiness & Industry*
BGEN 194US	*Business and Entrepreneurship Fundamentals*
CLS 101US & 201US	*Knowledge and Community*
COLS 101US	*First Year Seminar (Gallatin College)*
COMX 111US	*Introduction to Public Speaking*
EDU 101US	*Teaching and Learning*
HONR 202US	*Texts and Critics: Imagination*
LS 101US	*Ways of Knowing*
US 101US	*First Year Seminar*
US 121US	*Humanity, Society & Culture in the Digital Landscape*

The US CORE Assessment Committee decided to use the evaluation instrument with no changes; equating the four AAC&U levels as follows:

Benchmark (1) = Below Expectations
Milestones (2, 3) = Meets Expectations
Capstone (4) = Above Expectations.

Most Seminars reported their assessment results using the standard Below-Meets-Above Expectations levels, but at least one used the Benchmark-Milestone-Capstone language from the AAC&U Rubric.

SUMMARY:
Of the ten courses evaluated, nine easily reached the 60% "Meets Expectations" requirement overall. Only the US 121US course yielded below a 60% overall threshold (49%). With only 12 students enrolled, the US 121 director explained that only four student assignments were included for evaluation. The assignment used for this critical thinking evaluation also did not address one of the five criteria of the rubric. These two factors together provide the contextual

understanding for the lower rankings within this course. The report author provided a goal to strengthen the work leading to this particular assignment as a way to address the marginal results related to critical thinking.

Regardless of results, each US seminar director/instructor has identified targeted areas for future improvement related to the critical thinking outcome learning outcome as noted in each individual assessment report.

University Seminar Core Student Learning Outcome Assessment

Course Title: AGED 140US *Leadership for Agribusiness & Industry*

Author of Report: Carl Igo

Outcome Being Assessed: Critical Thinking

Semester and Year: Fall 2016

Course Enrollment: 63

Number of Course Sections: 5

Number of Assignments Assessed: 12

Assessment Team: Dustin Perry, Ass't Professor & Critical Thinking researcher; Ethan Igo, GTA; Austin Jones, GTA

Method of Selecting Work: The instructor used an online random number generator to identify students, based on their GID. Service Leadership Reflection papers were pulled for the 12 students by the instructor and all identifying student information was electronically removed.

Inter-rater Reliability: The assessment team reviewed the criteria and categories within the rubric. Each independently scored one paper then shared their ratings. In categories where scores were greater than 1 point apart, discussion ensued to reach consensus agreement. Each assessor then used the prescribed rubric (AACU) to score papers individually. All assessors evaluated each assignment.

Notes About Scoring: For each category, rubric scores were coded as benchmark (1), milestone (2), and capstone (3). Assessors' scores were entered into EXCEL for data analysis and mean scores.

Results:

Criteria	Capstone (3)	Milestone (2)	Benchmark (1)
Explanation of Issues	**1%**	**87%**	**12%**
Evidence	**2%**	**84%**	**14%**
Influence of Context	**4%**	**82%**	**14%**
Student's Position	**0%**	**78%**	**22%**
Conclusions	**4%**	**86%**	**10%**
Overall	**2%**	**83%**	**15%**

University Seminar Core Student Learning Outcome Assessment

Recommendations for AGED 140US:

While it is clear the overwhelming majority of students met milestone acceptability in all categories measured by the rubric, there is a concern about the number of students at benchmark (below expectations) on a final paper for the course. We sometimes forget these particular areas of targeted instruction are the responsibility of every faculty as they are important in every course. Of particular concern was the category of *Student's Position*.

Beginning in fall 2016, we will implement instructional changes to ensure students are able to critically examine multiple sides of an issue as well as acknowledging multiple perspectives. Earlier and more often during the semester, we will incorporate opportunities and expectations for students to both discuss and write about their own biases in relation to perspectives and hypotheses.

We have little understanding or explanation for the 22% of students who scored benchmark in the *Student's Position* category. Anecdotal evidence collected from spring 2017 AGED 140US students revealed there is minimal expectation for students at this level to develop and operationalize their own specific positions and to examine those positions coherently against other's viewpoints; the essays they are expected to submit are overwhelmingly informative in style, rather than persuasive or expressive.

University Seminar Core Student Learning Outcome Assessment Report

Course Title:	BGEN 194US Seminar. Business and Entrepreneurship Fundamentals
Author of Report:	Terry Profota
Outcome Being Assessed:	Critical Thinking
Semester and Year	Fall 2016
Course Enrollment:	Approx. 450
Number of Course Sections:	23
Number of Assignments Assessed:	46

Assessment Team:
Susan Dana, Myleen Leary, Sarah Cairoli and Terry Profota

Assignment and Method of Selecting Student Work:
The assignment selected for this evaluation was titled, "Entrepreneur Research Paper." It required students to choose an entrepreneur of interest and research their background, business idea, and to analyze, identify and support their leadership strengths and weaknesses. The assignment also required students to analyze, identify and support their personal leadership strengths and weaknesses. Finally, students were instructed to consider if they would be a good leader by comparing themselves with their entrepreneur and distilling key learning points to improve their leadership effectiveness.

Terry Profota, Course Coordinator, randomly chose four students from each of the twenty-three sections. Professors submitted two of the four papers for assessment. All identifying information was redacted from the papers which were then numbered in consecutive order from 1-46.

Method of Ensuring Inter-rater Reliability:
The University Core Seminar Committee elected to use the AACU Critical Thinking Rubric for this assessment. The rubric was adjusted from a four-level assessment to a three-level assessment which consisted of the following scoring levels: above expectations, meets expectations (a combination of two levels of the AACU Rubric) and below expectations.

Each of the scoring levels was given a numerical rating, with an "above expectations" score of 3; "meets expectations" a score of 2; and "below expectations" a score of 1.

Papers with overall average scores between 15-12 were classified as "above expectations"; overall average scores between 11-8 were classified as "meeting expectations"; and overall average scores below 7 were classified as "below expectations."

The Jake Jabs College of Business and Entrepreneurship (JCBE) assessment team gathered prior to assessing student work to discuss each criterion in relationship to the assignment and clarify what and how they would evaluate each criterion. Work was then assessed individually. Two assessors evaluated each assignment. No assessors evaluated their own student work.

Scoring Variances:
Of the 46 papers reviewed, 10 papers were reviewed by a third grader and after a second review a common rating was agreed upon. An additional 12 papers were reviewed and discussed by the two-person grading team and after a second review, a common rating was agreed upon.

Results:
Overall Averaged Results:

- 72% of the papers Met Expectations.
- 10% of the papers Exceeded Expectations.
- 20% of the papers where Below Expectations.

Breakdown per Criterion
An examination of individual criterion indicates that students were very strong in three of the five criteria, scoring a 75% or higher in the "meets or above expectations" levels. Students scored above the 60% "meets or above expectations" threshold on the "conclusions and outcomes" criterion, but just barely at 63%. Students did not meet the 60% threshold in just one criterion, "explanation of issues" with a combined score of 57%.

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of Issues	**7%**	**50%**	**43%**
Students Position	**15%**	**76%**	**9%**
Evidence	**20%**	**59%**	**21%**
Influence of Context	**9%**	**67%**	**24%**
Conclusion & outcomes	**13%**	**50%**	**47%**

Action Plan for BGEN 194:
Our action plan for improving students' abilities in "explanation of issues" and "conclusions and outcomes" follows:

Area of Focus	Action Plan
Explanation of Issues	Re-work the assignment to clarify the learning objectives of the assignment and to provide training to the teaching team so they can offer better prompts, educations, feedback and support. Provide additional time in class to work with students on understanding the purpose of the assignment and assist them in improving their abilities to clearly articulate issues and construct concise and focused thesis statement.
Conclusion and outcomes	The lower rating in this area was due in part because of a lack of clarity in the assignment. Many students did not include an analysis/comparison section in their paper; those who did scored at "meets or above expectations." The "Entrepreneur Research" assignment has been revised for S-2017. The section of the paper asking for conclusions and outcomes is more explicit and easier to understand for both students and the professors.

University Seminar Core Student Learning Outcome Assessment Report

Course Title: CLS 101/201US Knowledge & Community

Author of Report: David Cherry

Outcome Being Assessed: Critical Thinking

Semester and Year Fall 2016

Course Enrollment: 550

Number of Course Sections: 37

Number of Assignments Assessed 40

Assessment Team:
Mary Biehl, Instructor; Professor Walter Fleming, NAS; Jennifer Hill, Instructor; Professor Matt Herman, NAS

Method of Selecting Student Work:
Course manager randomly selected 1-2 final papers each from 37 sections. Papers were randomly assigned to two members of the Assessment Team for evaluation.

Method of Ensuring Inter-rater Reliability:
Two assessors evaluated each assignment. No assessors evaluated their own students' work.

Notes about Scoring:
Papers were scored against the AACU rubric for Critical Thinking, with a 1 representing "Benchmark", 2, "Milestones" 3, "Capstone". Scores were averaged across assessors.

Results:

Criteria	Capstone (3)	Milestones (2)	Benchmark (1)
Explanation of Issues	0%	90%	10%
Evidence	20%	75%	5%
Influence of Context	10%	85%	5%
Student's position	10%	80%	10%
Conclusions	5%	90%	5%

Recommendations for CLS 101/201: *In so far as 90-95% of students achieved the equivalent of a "passing" grade on all 5 criteria, no immediate changes are recommended in respect to the ways in which the course attempts to inculcate critical thinking attitudes and habits.*

University Seminar Core Student Learning Outcome Assessment Report

Course Title: COLS 101US First-Year Seminar

Author of Report: Jeffrey W. Hostetler

Outcome Being Assessed: Critical Thinking

Semester and Year Fall 2016

Course Enrollment: 66

Number of Course Sections: 4

Number of Assignments Assessed: 10

Assessment Team:
Jeffrey Hostetler, Instructor; Janet Heiss-Arms, General Education Director

Method of Selecting Student Work:
During the semester, each instructor made preliminary copies of a common writing assignment titled Comparative Essay. They removed any student identifying marks, and we then pooled the essays, randomly shuffled them, and instead of limiting ourselves to a 10% sample (6 essays) we decided to evaluate an even 10. This equates to a 15% sample size.

Method of Ensuring Inter-rater Reliability:
Janet and I have worked together evaluating writing and oral presentations, so we were confident our reliability would remain consistent, and the results support this.

Notes about Scoring:
If we did have a variation, we used the higher score, since we could not score ½ points to a criteria.

Results:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of issues	30%	50%	20%
Evidence	20%	60%	20%
Influence of context assumptions	10%	80%	10%
Student position (perspective, thesis/hypothesis)	0%	80%	20%
Conclusion and related outcomes	20%	70%	10%
Overall	16%	68%	16%

Action Plan for COLS 101US: Based on these results, we see nearly 1/5 of our students are performing below expectations regarding critical thinking. Although we are encouraged by the 68% average in the Meets Expectations category, we want to reach out and bring up these other students. Our goal in the next year will be to try and identify with early assessment in the classroom those students who might be in this category, and work with them individually in hopes of shifting them into the next category.

Additionally, as a campus we should consider inviting more scholars who specialize in evaluating and teaching critical thinking, and focusing a conference/seminar around these speakers. It could inspire all of us, provide campus faculty with an opportunity to present on their own critical thinking research and techniques, as well as generate new teaching and evaluation tools.

University Seminar Core Student Learning Outcome Assessment Report

Course Title:	COMX 111US Intro to Public Speaking
Author of Report:	Tammy Machowicz Olsztyn
Outcome Being Assessed:	Critical Thinking
Semester and Year	Fall 2017
Course Enrollment:	337
Number of Course Sections:	19
Number of Assignments Assessed:	38

Assessment Team:
Kathleen Byrne, Instructor
Tammy Machowicz Olsztyn, Assistant Teaching Professor
David McLaughlin, Associate Teaching Professor

Method of Selecting Student Work:
The assessment coordinator randomly chose two numbers to represent two students on each section's alphabetical class roster for a total of 38 persuasive speech outlines assessed. A number was assigned to each student paper, but all other identifying student information was removed. (COMX 111US instructors choose to evaluate the final and most complex assignment, the persuasive speech to evaluate critical thinking).

Method of Ensuring Inter-rater Reliability:
The assessment team met to review the core criteria and agreed upon how to define the categories for "above expectations", "meets expectations" and "below expectations" as it relates to the assignment being evaluated. Evaluators then assessed other instructor's student persuasive speech outlines individually using the AACU Critical Thinking VALUE Rubric. Two assessors evaluated each assignment. No assessors evaluated their own student work.

Notes about Scoring:
Scores were compared and tallied and an average score was given to each category if two evaluators scored the same work differently.

Results:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of Issues	21%	74%	5%
Evidence	30%	67%	3%
Influence of Context and Assumptions	37%	63%	0%
Student's position	30%	69%	1%
Conclusion and Related Outcomes	25%	68%	7%
Overall	29%	68%	3%

Recommendations for COMX 111US: *Overall, the evaluators/instructors of COMX 111US were satisfied with the results of the assessment; a majority (68%) of the students' persuasive outlines assessed met expectations for the criteria outlined for critical thinking, 29% exceeded expectations and only 3% fell below the overall criteria of the critical thinking rubric for the COMX 111US assessments.*

In Fall 2016, instructors implemented putting more emphasis on teaching the outline process, developing and defining clear thesis/propositions, and encouraged students to document and acknowledge required assignment elements which allowed us to better assess their critical thinking. In addition, instructors provided better documented outlines for students to use as templates. We think putting more emphasis on the strategies of building students' persuasive outlines, and defining and developing themes/propositions/claim statements may have contributed to strengthening COMX students' critical thinking for this assignment.

Overall, instructors were pleased with the results and will continue to meet each academic year as a COMX 111US teaching team to review teaching/learning standards and expectations to ensure we meet the needs of the learners.

University Seminar Core Student Learning Outcome Assessment Report

Course Title: EDU 101US First-Year Seminar

Author of Report: Nigel Waterton

Outcome Being Assessed: **Critical Thinking**

Semester and Year Fall 2016

Course Enrollment: 171

Number of Course Sections: 9

Number of Assignments Assessed: 18 (10%)

Assessment Team:
Nigel Waterton, Teresa Greenwood

Method of Selecting Student Work:
Course director randomly chose 2 numbers, to represent two students on each section's alphabetical class roster. Instructors submitted assignments to course director. Assiggnments were coded and anonymized.

Method of Ensuring Inter-rater Reliability:
The assessment team reviewed the assessment rubric prior to assessing student work agreed upon levels of achievement. We then assessed all student work individually. At least two assessors evaluated each assignment.

Notes about Scoring:
Differing scores were averaged for a difference of 1 and sent to a third reader for a difference of more than one.

Results:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of issues	33%	56%	11%
Evidence	28%	55%	17%
Influence of context assumptions	17%	72%	11%
Student position (perspective, thesis/hypothesis)	5%	78%	17%
Conclusion and related outcomes	17%	66%	17%
Overall	20%	66%	14%

Recommendations for EDU 101: *The EDU 101 team will continue to work with students who do not meet critical thinking expectations. We will consider both course content and individual students.Similarly, we will continue to challenge students who meet and exceed expeciations through course activity and readings.*

University Seminar Core Student Learning Outcome Assessment Report

Course Title: HONR 202 Texts and Critics: Imagination

Author of Report: Shannon D. Willoughby

Outcome Being Assessed: Critical Thinking

Semester and Year Spring, 2017

Course Enrollment: 362

Number of Course Sections: 25

Number of Assignments Assessed: 43

Assessment Team:
Simon Dixon, Tanner McFadden, Shannon Willoughby.

Method of Selecting Student Work:
The names of two students were chosen from each of the sections. Names were placed into a single excel file and a random number generator was used to choose each student according to their number in the spreadsheet.

Method of Ensuring Inter-rater Reliability:
The team discussed the criteria listed on the rubric. Several pieces of student work were assessed by two of the three team members in order to ensure inter-rater reliability.
No assessors evaluated their own student work.

Notes about Scoring:
Standard rounding methods were used. If two scorers disagreed, the average of the scores was taken.

Results:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of issues	47.5%	40%	12.5%
Evidence	52%	40%	7.5%
Influence of context	32.5%	55%	12.5%
Student's position	50%	37.5%	12.5%
Conclusions	35%	55%	10%

Action Plan for HONR202: *Because more than 10% of students were below expectations regarding these three areas, we plan the following actions:*

Area of Focus	Action Plan
Explanation of issues	Take time in class to have Faculty and Student Fellows use examples from the text to help explain issues. Encourage students to comprehensively discuss issues.
Influence of context	Ask students to clearly state underlying assumptions. Discuss in class why this is important.
Student's position	Clarify to students that their position/thesis must be clearly stated and easy to identify. This is best done during the editing process, either by peers or at the Writing Center. Ask Faculty Fellows to point out the thesis statement in written work.

University Seminar Core Student Learning Outcome Assessment Report

Course Title:	LS101US – Ways of Knowing
Author of Report:	Teresa Greenwood and Bridget Kevane
Outcome Being Assessed:	Critical Thinking
Semester and Year	Fall 2016
Course Enrollment:	90
Number of Course Sections:	5
Number of Assignments Assessed:	12

Assessment Team:
Greenwood, Teresa; Townsend-Mehler, John; Waterton, Nigel

Method of Selecting Student Work:
Teresa Greenwood randomly chose 2 numbers, to represent two students on each section's alphabetical class roster. Instructor sent papers to director by email, leaving the last name and first initial on each student piece, but removing all other identifying student information.

Method of Ensuring Inter-rater Reliability:
The assessment team gathered prior to assessing student work to review sample work and agree upon levels of achievement. Teams then assessed their work individually. At least two assessors evaluated each assignment. Bridget Kevane, Interim Director of Liberal Studies, reviewed the papers along with Greenwood and Townsend-Mehler's assessment. Nigel Waterton was the second reader of the papers from Townsend-Mehler's (JTM) classes.

Notes about Scoring:
In no case was there more than a category difference in the score of the two assessors and where there was a difference the student was scored in the lower category. So if one assessor scored a student benchmark and the second scored the same student at milestone (2), the student was coded at benchmark. This allows for a more conservative measure of overall student performance. A couple of papers (CP14B and LL14B) are outliers. CP14B represents an alternative assignment given to the student (reflect on your favorite quotation from one of the course texts). LL14B was submitted by the instructor because the student whose name had been randomly selected withdrew from the course. Students in LS 101 are doing well and 75% of papers met at least the criteria for "Milestone."

Continued on the next page . . .

Assessments:

CP6A	JT: 3, 2,2,2,3 TG: 3,2,2,2,2 Final: 3,2,2,2,2 Overall: 2
CP14A	JT: 3,2,2,1,2 TG: 3,2,2,1,2 Final: 3,2,2,1,2 Overall: 2
CP6B	JT: 2,2,2,3,2 TG: 3,2,2,2,2 Final: 3,2,2,2,2 Overall: 2
CP14B	JT: 0,0,0,1,0 TG: 0,0,0,1,0 Final: 0,0,0,1,0 Overall: 0
JTM14B	NW: 4,4,4,3,3 TG: 3,4 ,4,3,3 Final: 3,4,4,3,3 Overall: 3
JTM6A	NW: 3,4,4,3,3 TG: 4,4,4,4,4 Final: 3,4,4,3,3 Overall: 3
JTM14A	NW: 2,2,2,2,2 TG: 2,3,2,2,2 Final: 2,2,2,2,2 Overall: 2
JTM6B	NW: 4,3,4,4,4 TG: 4,4,4,4,4 Final: 4,3,4,4,4 Overall: 4
LL6A	JT: 1,1,1,1,1 TG: 1,1,1,1,1 Final: 1,1,1,1,1 Overall: 1
LL14A	JT: 1,1,1,1,1 TG: 1,1,1,1,1 Final: 1,1,1,1,1 Overall: 1
LL6B	JT: 1,1,1,1,1 TG: 1,1,1,1,1 Final: 1,1,1,1,1 Overall: 1
LL14B	JT: 3,3,3,3,3 TG: 3,3,3,3,3 Final: 3,3,3,3,3 Overall: 3 [Outlier – Instructor selected paper because the student whose paper was randomly selected withdrew from the class.]

Results:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of Issues	8%	57%	25%
Evidence	25%	50%	25%
Influence of context and assumptions	25%	50%	25%
Student's position	25%	50%	25%
Implications and consequences	8%	57%	25%
Overall	8%	57%	25%

Recommendations for LS 101: All of the "Benchmark" papers are from courses taught by one instructor whose final assignment is a reflection essay rather than a paper that calls for the student to state a thesis and develop an argument. Bridget Kevane, Tami Eitle (former Director of Liberal Studies) and the future director (Summer 2017) will discuss the direction the course should take in the future and whether a common syllabus or common final assignment is warranted.

University Seminar Core Student Learning Outcome Assessment Report

Course Title: US 101US First-Year Seminar

Author of Report: Margaret Konkel

Outcome Being Assessed: Critical Thinking

Semester and Year Fall 2016

Course Enrollment: 660 (post withdraw deadline)

Number of Course Sections: 42

Number of Assignments Assessed: 80

Assessment Team:
The Assessment Team included the following US101 Instructors who volunteered for the role: Amanda Bitz, Anna Greenberg, Molly Taylor, Erin MacDonald-Peck, Crystal Stanionis, Megan Swanson, Megan Bowen, Jim Thull, Judi Haskins, Kathleen Melee, Jade Lowder, and Alli Gidley. Team leaders included Meg Konkel, Director of First-Year Seminar, and Deb Blanchard, Assistant Director of First-Year Seminar.

Method of Selecting Student Work:
The Seminar Director and Assistant Director determined that the Presentation Storyboard assignment would be the assessed assignment (see attached assignment description.) The Presentation Storyboard functions as a narrative or script for a Pecha Kucha presentation of a research project students are engaged with in the final 5 weeks of the semester. The Storyboard assignment aligns well in what is being asked in the AACU Critical Thinking rubric, and supports the AACU's definition of critical thinking as a process of comprehensive exploration of issues and ideas.

A random sample of student work was collected by the following process:
1. the Assistant Seminar Director pulled from a set of numbered cards two numbers which translated to students in an alphabetical list. The numbers drawn were #2 and #12.
2. All faculty were asked to pull the #2 and #12 assignments from their Presentation Storyboard assignment folder in D2L.
3. Faculty were asked to remove any identifying information from the documents selected, to upload both files to a Box folder using a file name that identified each assignment by section and by student code (Student A and Student B) to ensure anonymity.

Of the initial sample of 85, 5 Storyboards were submitted but incomplete, or not conforming to the nature of the assignment – the Storyboard assignment asks students to incorporate a full narrative of their presentation. In some cases, students incorporated self-directed instructions, such as "talk about issue here," instead of a full narrative, and those Storyboards were dropped from the sample set.

Method of Ensuring Inter-rater Reliability:

Based on our experience in the previous two years of program assessment, it was determined that the common US Core Critical Thinking (AACU) rubric would be used as the basis for the evaluation rubric for the Storyboard assignment in the course. In this way, all instructors would have familiarity with the standards and expectations of the common assessment rubric, and students would have transparency as to the expectations both for the course and the common US Core program.

Volunteers were solicited among the US101US Instructors at the mid-semester, and volunteer assessors were paired in teams of two. Box folders with batches of assignments (11 per team of two) were established, and the US Core Critical Thinking Rubric was distributed to each team. No team members assessed any student work from their own sections to ensure objectivity. An online assessment rubric was employed to complete the scoring, and numerical values were assigned to each of the scoring levels.

Notes about Scoring:
The US Core Critical Thinking rubric has 4 measures for scoring:
Level 1 – Benchmark
Level 2 – Milestone
Level 3 – Milestone
Level 4 – Capstone

In discussion, the US Core Committee agreed to score assignments using the 4-level scoring system, but to calculate assessment based on the following:

Level 1 – Below Expectations
Levels 2 and 3 – Meets Expectations
Level 4 – Above Expectations

Once the assessment scores were submitted, the Seminar Director reviewed the two assessor scores for each essay. The two scores for each essay were then averaged to provide a single numerical score for each criteria category. If a student earned both a 2 and a 3 for one criteria, the average score of 2.5 was recorded. A total average score for all criteria categories was then generated.

Scores were rated based on the following:
Below 1.9 = Below Expectations
2.0 – 3.9 = Meets Expectations
4.0 = Above Expectations

Results:
The overall average score for the assessment was 2.4 (Meets Expectations.) The distribution of those average scores is as follows:

Score	Quantity	Percentage
4	1	1.3%
3.0 - 3.9	14	17.5%
2.0 - 2.9	44	55.0%
0 - 1.9	21	26.3%

*Based on this distribution, **73.8% of our students met or exceeded** the expectations of the program relative to their work in Critical Thinking, while **26.3% of our students fell below** the expected standard for Critical Thinking in the program.*

When looking at each of the assessment categories, our students exceeded the target in their ability to meet or exceed expectations in the demands of that category. The following table represents the percentage of individual storyboards that fell within each level of achievement (note: percentage values may not exactly add to 100% due to decimal rounding):

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of Issues	7.5%	86.3%	6.3%
Evidence	5%	77.5%	17.5%
Influence of Context and Assumptions	1.3%	82.5%	16.3%
Student Position	1.3%	73.8%	25%
Conclusions and Outcomes	1.3%	70%	28.8%

Action Plan for US101US:

Given the central importance of Critical Thinking in this course, the assessment was fruitful to our program in many ways. We were able to identify consistent strength across all of the factors included in the rubric in our students' work; in no measure do we fall below the target of 60% for the US Core assessment.

Additionally, this assessment has been productive in providing some clarity in how we integrate Critical Thinking into our course, and how assignments make progress from stage to stage in the development of skills outlined in the rubric. Our goal for the upcoming year is to make that progression much more transparent, not only to our students but more importantly to our instructors. Each of our assignments is designed to pick up on each of the factors included in the CT rubric, but it's clear based on some of the questions we encountered from our assessors (who are also instructors) during the assessment process that we can be much more direct in communicating that design to them.

University Seminar Core Student Learning Outcome Assessment Report

Course Title: US121US

Author of Report: Meg Konkel

Outcome Being Assessed: Critical Thinking

Semester and Year Fall 2016

Course Enrollment: 12

Number of Course Sections: 1

Number of Assignments Assessed: 4

Assessment Team:
Margaret T. Konkel, Seminar Director, and Deborah Blanchard, Assistant Seminar Director

Method of Selecting Student Work:
The Seminar Director and Assistant Director randomly chose 4 numbers between 1 and 12 (course enrollment), and the Instructor provided those samples with names redacted and identifying features removed. The Seminar Director and Assistant Director then read and scored the assignments based on the rubric.

Method of Ensuring Inter-rater Reliability:
The assignment being assessed for US121US is an Annotated Bibliography connected to a research exercise students in the course complete. To ensure reliability, the two assessors met to review the scope of the assignment, and to compare the expectations of the assignment against the rubric and its evaluation categories. Once a common interpretation of how the assessment measure might be evident in the assignment parameters, each assessor read and scored all four assignments.

Neither of the assessors teach in this course, so all student work was evaluated by those other than the course instructor.

Notes about Scoring:
All scores were tabulated in the following way: an overall average score was calculated for each student, and then the two scores were averaged to compute a single overall score per student. In addition, an average of each criteria's scores was tabulated in order to provide an average score per criteria. When two scores differed, an average was calculated in order to have a single score per criteria per student, which then informs the rankings.

One note regarding the assignment: given the nature of the Annotated Bibliography assignment, the "conclusions and outcomes" criteria of the assessment rubric was dropped. Students were asked to communicate evaluation of their sources that addressed all other criteria in the rubric, however no conclusions or outcomes of the source assessment were asked for in the scope of the assignment.

Results:

The overall average score for the 4 samples assessed was 1.9 – the scores were 1.0, 3.3, 1.4, and 2.1. In part, this is representative of such a small sample size – with a single section being offered each fall only, any sample other than the whole group may be misleading.

The criteria scores are as follows:

Criteria	Above Expectations	Meets Expectations	Below Expectations
Explanation of Issues		25%	75%
Evidence	25%	50%	25%
Influence of Context and Assumptions		50%	50%
Student Position		50%	50%
Conclusions and Outcomes	n/a	n/a	n/a

Recommendations for US121US:
As noted above, the numbers as indicated are difficult to interpret given the sample size. However, it's clear that students completing this style of assignment are comfortable and competent examining the evidence of the text and questioning the source's viability and bias. The other factors represent less competence, and Seminar Directors will work directly with the Instructor of this course to strengthen the work leading up to this assignment (and the larger project it sits in) to address these challenges.

Undergraduate assessment reports are to be submitted to programassessment@montana.edu

Assessment Report for Diversity Core Courses

Academic Years: 2010-17

I. What Was Done

The Diversity Core Committee reviewed all the courses that were proposed for Diversity Core designation. The proposals included detailed rational addressing the Core Diversity criteria as well as a syllabus. To evaluate the proposals, committee members focused on the following questions:

1. Does this course "focus in-depth analytical and critical attention to difference and to historical, cultural, and/or racial social contexts, with an emphasis on class discussion and active student engagement"?

2. Does this course fulfill one of the below three criteria?

   A. The course examines identity in relation to race, ethnicity, gender, sexuality, class, nationality, ability, and/or other axes of difference.

   B. The course teaches a language other than English and includes the examination of the culture(s) that speak(s) the language.

   C. The course examines the historical, political, cultural, and/or social forces that foster systemic disparities based on difference, and critically examines concepts of difference within these systems.

3. Do students who complete the course acquire at least one of the following?

   A. An analytical and critical understanding of diversity within societies, nations, and cultures.

   B. Knowledge of a language other than English and the culture(s) that speak(s) that language.

   C. An analytical and critical understanding of particular, traditionally marginalized, or less frequently studied societies, nations, and/or cultures and an understanding of cultural difference in relation to those societies, nations, and/or cultures.

Courses that met the criteria were approved for six years. On the sixth year, if instructors wish to continue offering their courses with a Diversity designation, they must reapply. This entails sending the Diversity Committee, their current course syllabus and rationale for reapproval. Hence, the committee is constantly reviewing diversity courses to assure that they continue to meet the diversity criteria.
In the past three years, in anticipation for this review the committee has reached out to departments offering diversity courses and asked that the students' learning outcomes, as they pertain to diversity, be assessed. The committee offered departments the following assessment guidelines:

Proposed Assessment Strategy

1) *Each course instructor will be required to add a section to his/her course proposal – both for new course proposal and for renewals – that addresses what type of assignment will be used to*

assess the effectiveness of the course in meeting the stated learning outcomes for Diversity. This might include a specific exam, paper assignment, or, in the case of the language courses, a verbal communication requirement. Sample questions for an exam/paper/other assignment could be as follows:

- *Using [insert course and subject specific material], explain the concept of race and how it is culturally constructed. Discuss how this affects modern views and understandings of race in [insert subject specific material]?*
- *Using [insert course and subject specific material], explain the concept of divinity and how it is culturally constructed. Discuss how these varying understandings affect interactions between societies and religions and how they influence conflict in [insert subject specific material]?*

Or, for language classes, a sample assessment assignment might address the following question:

- *Does the student's performance on the exam/assignment indicate that he/she understands, reads, speaks, and writes the language at a level appropriate to the term of study?*

2) *For each class, a random sampling of 5-10% the students who write the assignment will be taken for assessment.*
3) *Because of the diverse nature of Diversity, the actual assessment will be carried out by the Department in which the course is offered, as these faculty members, are, by definition, the most qualified to address the subject matter of the course. Each class is already in an assessment rotation schedule established by each Department as part of its own assessment policy for their degree offerings. When a class with a D designation is assessed for the Department, the assessing faculty member (e.g., Japanese language instructor, anthropologist, historian, etc.), who is not the department member actually teaching the class that semester, will also assess the effectiveness of the class for the Diversity learning outcomes.*
4) *To demonstrate that the course has successfully met the proposed learning outcomes, two-thirds of the assessment group (66%) must pass the assignment with a C grade or higher.*

2. What Data Were Collected

A. The committee collected assessments for 25 Core Diversity courses (MSU offers a total of 43 Diversity courses). It requested that the assessment focus on the effectiveness of the course in meeting the stated learning outcomes for Diversity. Due to the diversity of the courses offered (some are seminars, while others are dispensed in large lectures format), the assessment style varied greatly. For instance, foreign language and culture courses, used the ACTL proficiency metrics to assess the extent to which students acquired "Knowledge of a language other than English and the culture(s) that speak(s) that language." A political science course evaluated students' responses to a final exam question that focused on the following diversity learning outcome: "An analytical and critical understanding of diversity within societies, nations, and cultures." While literature courses tended to assess students' papers in relation to this same learning outcome. Most evaluators chose to assess a random sample of students' works, while others assessment all the students' answers to a particular question, written or oral exam.

3. What Was Learned

Assessments indicated that over 95% of students completing the diversity courses we examined have reached the expected learning outcomes as outlined above.

4. How We Responded

The committee is recommending ongoing assessment of diversity courses and continuing the requirement for reapplication of core designation every six years.

W-Core Assessment Report: 2014-2017 Cycle

August 2017
Director of Composition, MSU Core Writing Program

Contents

Summary

The W Core is assessed by the MSU Core Writing Program (CWP) on a 3-year cycle of two readings of student portfolios (years 1 and 2) and a development year (3) to implement curricular and faculty development based on assessment findings. The 2014-2017 cycle was the first instantiation of this plan. Readings conducted in summer 2014 and summer 2015 indicated that **WRIT 101, the sole W course, did meet its outcomes target, with 80 percent of student work scoring 2.2 in 2014 and 2.5 in 2015 on a 4 point scale, across all outcomes.** (Target score is 2.) In addition, **the cycle validated all aspects of the assessment procedure** (collection of writing portfolios, reading and scoring of portfolios, and analysis of results to generate curricular and faculty development goals and initiatives) **and plan** (first year reading leading to a refined second year reading and the findings of both readings shaping an additional year of curriculum and faculty development). While the 3rd year of the cycle, implementation of findings in curriculum and faculty development, was delayed by a 1-year funding cut, funding was restored so that **2017-18 will serve as year 3 of the first assessment cycle**, with a new cycle beginning summer 2018.

W-Core Learning Outcomes

The W Core at MSU is satisfied by the completion of WRIT 101, so MSU's WRIT 101 learning outcomes are shared with the W-Core. After completing WRIT 101 / fulfilling the W Core requirement, students will

- Demonstrate themselves to be reflective writers
- Show willingness to take risks in new writing situations
- Collaborate with other writers
- Demonstrate ability to read rhetorical situations
- Demonstrate control of situation-appropriate conventions of writing
- Integrate source material in their writing

Measures for each outcome are included in the full outcome sheet at the end of this report. Outcomes are assessed in student writing in WRIT 101, the sole W course at MSU. Performance related to each outcome is scored in student writing on a 0-4 scale (0 Not Present, 1 Lacking, 2 Sufficient, 3 Significant, 4 Extensive). Target performance is 80 percent of assessed writing scoring 2, Sufficient. Given the holistic nature of writing assessment, all outcomes are scored in each assessment reading.

Implementation of Assessment Plan

For more detail on the assessment plan, please refer to the 2014 W Core Assessment Plan. The plan was implemented as designed, and is summarized here.

Year 1 (Summer 2014-Spring 2015)
A sample of student portfolios was collected as described in the plan. 75 portfolios (25 each rated by their instructors as high, medium, or low achieving) were submitted for the assessment reading, each read by 2 of 6

readers. The readers, as faculty for the course being assessed, did not read their own students' work. The two pieces of student writing in each portfolio were evaluated for performance in each of the six W-Core learning outcomes, scored on a 0-4 scale as described above. The daylong reading included an hour for reader preparation and norming, 7.5 hours of reading, and a 45-minute closing discussion of observed trends and comments on student work and on the assessment system and reading itself. Readers were paid $200 for the day.

The CWP's Director of Composition (who served as Assessment Leader throughout this cycle) compiled scores and prepared a verbal report to WRIT 101 faculty at their 2015 retreat prior to Fall semester. Drawing from both quantitative scoring and reader commentary after the reading, the assessment team determined to update some procedures in the second reading year:

- Requiring electronic files of student writing with changes tracked (rather than separate paper drafts), for ease of review of revision and collaboration during the assessment reading
- Revising the scoring sheet to be more intuitive for readers to complete
- Increasing the number of readers from 6 to 8 to reduce total reading time
- Using the gained time to expand the preparation/norming period to 2 hours, with special emphasis on assessing Outcome 3 Collaboration, and extend discussion time at the end of the reading.

Because year 1 was treated as the first half of a baseline assessment, no recommendations were made to WRIT 101 faculty regarding curriculum, though we noted reader dissatisfaction with student performance on Outcome 6, Source integration.

Year 2 (Spring 2015-Spring 2016)
Sampling of student writing and conducting of the assessment reading were completed as detailed in the plan (again resulting in submission of 75 portfolios), with the modifications identified after the Year 1 reading. (These modifications are both anticipated by and called for in the plan.) While most of the modifications had positive results, we continued to have trouble collecting drafts of the major assignment, again impacting readers' ablility to assess Outcome 3 Collaboration. Detailed results of the Year 2 reading are discussed in *Assessment Findings* below.

Year 3 (Spring 2016-Spring 2017)
Ordinarily the third year will design and implement curricular and faculty development based on the Year 1 and 2 findings. This cycle, however, was interrupted by a one-year withdrawal of faculty development and assessment funds, during which no assessment-related activities were conducted. See *Curriculum and Faculty Development Based on Assessment* below for our plan for 2017-18 with funding restored. We will complete the assessment cycle in Spring 2018 and commence the following cycle in Summer 2018 with another reading of student portfolios.

Assessment Findings

Quantitative Scores
The scoring target for achievement of learning outcomes in WRIT 101 is 80 percent of portfolios scoring 2 (Sufficient) on a 0-4 point scale. To develop the chart below, two readers' scores of each outcome for each piece of student writing were averaged, and all average scores for each outcome were averaged for each year.

	2014 Portfolios (N=75)		*2015 Portfolios (N=75)*	
Outcome	**All Pfolios**	**80 Percent**	**All Pfolios**	**80 Percent**
1. Reflective Writer	2.3	2.5	2.5	2.7
2. Risk-taking	1.8	2.0	2.2	2.4
3. Collaboration	1.6	1.8	2.1	2.4
4. Rhetorical Reading	1.8	2.0	2.2	2.5
5. Conventions	2.2	2.5	2.5	2.8
6. Source Integration	1.9	2.2	2.2	2.5
Means	**1.9**	**2.2**	**2.3**	**2.5**

In 2014, the first year of this assessment system on the current plan, scores mostly averaged close to our outcomes target, with Outcome 3, Collaboration with other writers, missing the target 2 score for 80 percent of

portfolios. (Only 66% of portfolios met the goal of 2 on that outcome.) The 2015 reading (plan year 2) showed higher scores across the board that largely reflect improved preparation and norming of readers. Quantitatively, no problem areas appear in the 2015 reading. In future assessment cycles, we would like to see scores stabilize between year 1 and 2 readings (in the absence of significant curricular changes) for confidence in the reliability of our scoring. We would also like to see these scores rise with. While our target scores and thresholds are fair, realistic, and reasonable, faculty would like more students to demonstrate greater ability on W-Core outcomes.

Qualitative Observations
At both the year 1 and year 2 readings, before scores were compiled, the assessment team discussed patterns and trends emerging in the student writing and course materials they reviewed.

- **While the numerical scores reflect students meeting the target for Outcome 6, Source Integration, readers believed students were consistently underperforming in this area,** and *requested development of the 101 curriculum to address it.* Readers' discomfort with much of the performance they saw on this outcome even as students met our numerical target suggests that *we should consider adjusting the threshold score for this outcome to better reflect readers' actual expectations.*

- The **difficulty of identifying Outcome 3, Collaboration with other writers**, in papers that did not come with a draft and with reflection on revision based on feedback (the chief traces of collaboration) was a problem for readers in both years. The low score in this area both years (problematically low the first year) seemed as much a result of difficulty in tracing collaboration with the data in hand as an accurate measure of student's collaboration with other writers. *We need a better means of assessing this outcome*.

- **The next most troublesome outcome to assess was Outcome 2, Risk-taking.** Readers found that what constituted "taking a risk" was a significant judgment call most of the time, and also noted that risk was difficult to objectively assess when differing writers appeared to have different thresholds for recognizing a writing move as risky, and when what might not be a risk in one instructors' classes might be in another's. *Readers concur that the risk-taking outcome is important, but find measuring it difficult.*

- **The highest-scored outcome in both years' readings was Outcome 5, Control of situation-appropriate conventions**. This reflects a well-known effect in the evaluation of writing: Conventions are the most "surfaced" or obvious features of writing, and therefore tend both to get the most attention in writing instruction and to be the most visible outcome during assessment. *In future assessments, we should try to distinguish whether the consistently higher scores on this outcome compared to others mean that readers are simply noticing the presence of this learning more easily than other kinds, or whether faculty are underemphasizing other outcomes relative to control of conventions.*

- Our outcomes, courses, and assessment put great weight on reflective writing, which helps students explain choices in their writing and offer perspective on how they're experiencing writing in their course. But **readers were frequently frustrated by silence in the reflective writing on outcomes that needed direct discussion to be best assessed** (particularly collaboration and risk-taking). While we continue to value assessment that lets choose diverse assignments, *we need to create a standardized reflection prompt* to be sure that students address their reflection to serve not only our *assessment* of their learning outcomes, but prompt them to reflect better on the outcomes themselves, enhancing their learning.

- Instructors in WRIT 101 use many major paper assignments. **As long as the assignments emphasize learning relevant to the W-Core outcomes, we see this diversity as a feature, not a bug.** *Having to "learn" a wide variety of assignments during the assessment reading does stress readers*. However, observing this variety creates another strong benefit of assessment: The opportunity to review course materials not simply in the abstract (as when instructors submit them for annual review) but in concert with several pieces of writing the assignment actually leads to. *Readers were thus able to identify assignments that, while interesting, did not seem to engage the activities emphasized in W-Core outcomes*, and *we now have a basis to talk amongst instructors about how to revise such assignments.*

- **The relatively even and realistic averages of scores on the 0-4 point scale suggestions that our process of high/mid/low sampling is working** to produce a representative sample of student achievement across varying levels of performance. *We expect to continue to use it in future assessment cycles.*

Curriculum and Faculty Development Based on Assessment

As noted, our Year 3 implementation of assessment data in curricular and faculty development has been delayed one year due to cut funding. Funding was restored at the end of Spring 2017 and the third year of our assessment cycle will now conclude Spring 2018. Based on two years' assessment data, our foci in this third year are these:

- **Develop a standard reflection prompt for WRIT 101 that guides students in reflection specifically including W-Core learning outcomes.** A small team of instructors will be tasked with developing and presenting a reflection prompt to WRIT 101 faculty by Nov. 2017. All WRIT 101 faculty will include the prompt / assignment in their Spring syllabi, and the new reflection assignment will be collected in portfolios for the summer 2018 assessment reading. We expect this new component of assessment to allow us much better measurement of the currently difficult-to-assess Outcomes 2 (Risk-taking) and 3 (Collaboration with other writers).

- **Consult with faculty on major course assignments that seem weakly connected to W-Core learning outcomes**. In the assessment readings, some assignments were identified as not leading to writing that lent itself to assessment based on the learning outcomes. While we remain committed to not requiring a program-wide major assignment in WRIT 101, and while we recognize the value of assignments that teach more broadly than the W-Core outcomes, we do want to coach instructors to ensure that their major assignments do engage the W-Core outcomes among whatever other work they do. To accomplish this, in early Fall 2017 the Director and Assistant Director of the CWP will review assignments flagged in the assessment and design a faculty development workshop on assignment design based on the difficulties we see in the flagged assignments, followed by an assignment exchange among faculty for feedback on assignment revisions.

- **Examine ways our assignments and course instruction are teaching students to integrate source material in their writing (Outcome 6) and develop guidance for instructors in strengthening student learning in this area**. The source-integration outcome was identified by readers as a most noticeable area of student weakness. (Other areas that appeared weak, readers encountered as an assessment problem more than a student learning problem.) Throughout Fall '17 we will use faculty development meetings and a small curriculum development team (in consultation with research librarians at Renne Library) to engage instructors in considering how we're currently teaching source integration and alternatives that might help students learn more in this regard. We will work to develop a set of best practices for WRIT 101 faculty to begin implementing in Spring '17.

The implementation and results of each of these items will be assessed in the next cycle, beginning with the summer 2018 assessment reading.

Appendix E

Materials Science PhD: External Advisory Board Report and Business Plan

DEPARTMENT OF MATERIALS
SCIENCE AND ENGINEERING
DUPONT HALL

University of Delaware
Newark, Delaware
19716
Ph: 302/831-3251
Fax: 302/831-4545

January 9, 2017

The External Advisory Board met with the campus leaders, director and campus deans on 10/14/2016 at the Montana State University for the purpose of reviewing the progress and status of the Montana Materials Science Program. The review was based on the seven areas defined in the Scope and Role Document distributed to all participants in October 2014. These areas are listed along with EAB assessments, critiques and suggestions.

The Montana Materials Science program continues to make good to excellent progress in all categories. This is the result of extensive efforts on the part of the campus directors and the center director, Professors Walker, Downey, Holian and Sofie. This team continues to demonstrate a strong, productive working relationship and all are committed to the success of the Materials Science program. They are to be commended for their efforts. The program growth has been good, but the number of students is on the low end of the target. This shortcoming might be expected, as enrollment in a new program will be susceptible to the statistics of small numbers. One 'off year' will appear to carry disproportionate impact on perceived program progress. As of 2016/2017 there are 25 MatSci students, which is certainly acceptable for the early stage. There should be continued focus on attracting high quality students from both a national and international pool to this program. The active role played by MatSci in the current EPSCOR proposal "Montana Restoration and Environmental Materials Initiative" is extremely important and indicative of the growth of the MatSci program. This proposal, if successful, will go a long way towards providing direct evidence of the value of the program.

Recommendation

1) Continue to facilitate early, competitive offers to potential graduate students.
2) Implement a campus visit program at all three institutions if possible. Many departments find that potential students can benefit from visiting and talking to current graduate students. Current Mat Sci students can be the best vehicles for attracting new students.

Scope and Role

1) Curriculum/teaching—The content and structure of the curriculum, the perception of the program from both students and faculty, the relevance of courses to the external materials science environment, the integration of

courses with research programs, the breadth and depth of core courses and the breadth of elective courses.

The curriculum for the mandatory courses is now well established, with nine faculty participating over the last three years. Six courses are offered to students in their first year. There is a good integration of these introductory courses with the various research programs. An additional encouraging sign is that these classes draw some graduate students from outside of the MatSci program. The logistics of handling the distance learning is coming along with only a few minor glitches. This scheme forms the structural basis for all cross campus courses, including electives as they are added. The directors recognize that electives need to be added, but this addition is limited by available faculty hours. Availability of the "wired" classrooms still somewhat limits the number of additional courses that can be offered. There needs to be additional classrooms and coordination between campuses for real-time instruction across the three campuses.

Recommendations

1) Continue to rotate faculty through the core courses if possible. Expand the base faculty who are active participants in the teaching side of MatSci.
2) Look across all three campuses for existing courses in other disciplines that might serve as electives, without increasing the faculty teaching load. Doing so will place additional demands on each campus' distance learning infrastructure that may require widespread institutional support.
3) Further publicize the core courses to other departments for their students not in MatSci.

2) Research—The nature of supported research, the sources of funding, the breadth of funding sources, the submission/success ratio, the dissemination of research results both internal and external and the balance between collaborative versus individual programs. Identify strengths and weaknesses in all areas of materials science. Recommend new emerging areas of research that need resources, existing areas of research that should be continued and marginal areas of research for de-emphasis.

The research component of MatSci continues to show strength with three new hires of junior faculty who have clear interests in the materials science program. The national recognition through NSF and DOE Career Awards to Mat Sci affiliated faculty, speaks to the quality of the research especially by younger PI's. The breadth of the research across materials science is impressive for an early stage program. However, the Mat Sci leadership (including campus and program directors and graduate deans) still needs to focus on quantitative data showing how the MatSci Program has sparked and

cultivated collaborations through an increase in proposals written and proposals funded. This issue is due, in part, to a gap in the accounting at each institution's research office where no clear mechanism exists to tag proposals as being materials science related. The campus directors and Deans need to continue to work on getting a mechanism in place on all three campuses and the respective research offices to track this involvement. This accounting will be absolutely necessary in the long term to provide data that could be used to eventually arrange a return of overhead to the materials science program. In order to be truly successful, the materials science program will need to establish a measure of financial self-sufficiency so that resources can be reinvested to provide student support, shared instrument maintenance and a financial buffer that cushions the program against year-to-year university budget fluctuations.

Recommendation

1) Develop ability to track grant and contract proposals that originate from a MatSci involvement.
2) Publicize on the web site recipients of grants, contracts, and awards.

3) Coordination (tri-campus)—the number and quality of programs spanning more than one campus, the demographic distribution in courses, recruitment of graduate students and the effective use by students of educational resources located on campuses other than their own home campus

The coordination across the three campuses was listed as the first major challenge facing the materials science program. This concern has been very effectively addressed at the campus director level, and at the Dean level. This success now needs to be extended to the administrative support level on all campuses.

Recommendation

1) Identify admin support people on each campus who will work together to address administrative problems, such as ghost registrations, class scheduling, etc.

4) External presence—the extent of dissemination outside of the campus, impact on STEM education outside of the Universities and the extent of industrial collaboration and cooperative efforts

The EAB recognizes that this aspect was not a high priority for materials science leadership during the two years of the program. We agree that this perspective was appropriate. However, this need has been addressed during the last period. The identification of more than 30 companies who have pledged internships and expressed hiring preferences is a wonderful step forward. Any internships that provide some financial support through fellowships are especially beneficial. There needs to be a continued emphasis

on presenting MatSci to the outside world through campus visits, meeting attendance and publications.

Recommendation
1) Continued emphasis on publicizing MatSci in external lectures and publications.
2) Explore the possibilities for internships and fellowships with local industries.

5) Collaborations—extent of collaborative and team based programs, industrial collaborations, collaborations outside of MT and joint research at other universities and national laboratories.

The collaborations are excellent and appear to be growing within the three campuses. The expectation is that external collaborations will increase as the stature of the program increases.

Recommendations
1) Track all publications, talks, and grants with demonstrable collaborations within MatSci. (In many respects, the goals of items (2) and (5) are coupled closely.)

6) Impact, both internal and external—publications, grants, recognition, number of faculty associated with the program and student participation.

As mentioned previously, the funded programs and publications are quite good. With forty faculty involved at some level, the participation by faculty in the program is off to a very good start. However, we are now entering a period where hard numbers will be needed to show the impact of the program.

Recommendations
1) Assemble list of publications with MatSci students as authors.
2) Assemble list of publications where two or more affiliated faculty are authors and where the research can be reasonably connected with MatSci.
3) List all grant proposals where the proposed work can be associated with MatSci. Highlight ones where the collaboration arose from the MatSci connection.
4) Encourage faculty to list MatSci affiliation in grant proposals, publications and talks.
5) Publicize awards, grants etc. on the web page.

7) Administration—effective implementation of reciprocity across all campuses.

There appears to be excellent cooperation between the campus directors with each other and the support from the campus Deans has helped to facilitate this.

As the program continues to develop, there is a strong need to improve the "buy-in" from the department heads, deans and other administrative personnel across all three campuses. It is clear that for this program to continue to grow, resources will have to come from individual departments on all three campuses. There will be a cost at this early stage that all institutions must accept. These costs need to be looked at as an investment that will provide major returns as the program matures.

Recommendation
1) Institute specific administrative staff on each campus to allow for direct, responsive communications to address administrative campus coordination issues. This should facilitate smoother operations without involving the campus directors for administrative issues.

The MatSci program is making excellent progress with no immediate major issues that could derail the program. However, the single largest long-term concern is funding of the MatSci program. This currently exists as campus based support through fellowships. As it becomes possible these amounts should be increased and cover longer periods of time. Eventually, the MatSci program should become at least somewhat self-sustaining. One possibility is through return of overhead on grants and contracts. The efforts made to quantitate the contributions from MatSci to all three institutions will play a major role in negotiations for support.

Bruce Chase, Millie Firestone, Chris Pistorious, Anil Virkar

Business Plan for
Montana University System
Collaborative Materials Science Ph.D.

"The World we have created today, as a result of our thinking, thus far has problems which cannot be solved by thinking the way we thought when we created them."
Albert Einstein

1. Summary

The University of Montana-Missoula (UM), Montana Tech of The University of Montana (MTech), and Montana State University-Bozeman (MSU) propose a collaborative Ph.D. program in materials science (MatSci). The program will involve multiple departments, faculty, courses, and research infrastructure from all three campuses. Research specialties will focus in biomaterials; electronic, photonic, and magnetic (EPM) materials; materials for energy storage, conversion, and conservation; and materials synthesis, processing, and fabrication—all areas that are inextricably tied to Montana's economic interests and areas where the three campuses individually or collectively have nationally recognized expertise.

The curriculum will cohesively integrate relevant science and engineering disciplines with a broad range of applications: from health and medicine to nanotechnology to energy, environment, and natural resources. Courses will be coordinated and shared by the three campuses, taking advantage of on-line instructional technologies where appropriate. Students entering the program are expected to have backgrounds in the basic sciences and/or engineering. Each student will complete original, independent research culminating in a doctoral dissertation. Major funding will be obtained from federal agencies, national laboratories, and industrial partners. Graduates will likely find employment with research, development, and manufacturing companies in Montana, the region, and the nation. Academia and government laboratories and agencies are also possible career pathways. State and local economies are expected to benefit significantly from the ensuing increase in material-based entrepreneurial ventures and to gain the ability to attract a diverse range of materials-based private-sector corporations, international entities, and/or start-ups. Program details are described in the Level II submission. This business plan summarizes program features and financial analysis most applicable to the financial/business viability of the program.

2. Mission, Vision, and Core Values

The mission of the MUS MatSci Ph.D. program is to advance knowledge and techniques while preparing the next generation of leaders in materials research, application, and education. The program's vision is to become a top-ranked program, sought after by students, sponsoring agencies, and industry, with high student demand, placement success, and positive impact on Montana's economy. This mission and vision align directly with those of the participating campuses and the MUS, as described in detail in Section 4D of the Level II proposal. Noteworthy contributions are expected to Montana's workforce and economic development, research and development, graduate education capacity and opportunities, and efficiency and effectiveness. In addition, through this program Montanans will have affordable access to the highest level of educational opportunity in materials science and closely related fields.

The proposed program's core values are:

- High standards of academic quality, research originality, and significance
- Integrity
- Interdisciplinarity and collaboration, with administrative processes transparent to the students
- Service and value to Montana, the nation, and world
- Efficiency and effectiveness

This three-campus collaborative Ph.D. program is designed specifically to ensure that the curriculum, courses, mentors, research teams, infrastructure, funding, and governance will sustain its interdisciplinary and collaborative nature; with educational experiences and original research of the highest quality, integrity, significance, and value to Montana; thereby achieving high efficiency and effectiveness while preparing graduates for the workforce and fostering economic development in Montana.

3. Goals and objectives

Given its goals, the MatSci Ph.D. program will contribute significantly to the intellectual climate and research environment on the three campuses. Furthermore, the program aspires to become a top-ranked program in its fields and to serve students superbly by achieving high student retention, timely degree completion, and direct pathways to careers. In terms of value to the campuses and more broadly to the MUS, the program's objectives are to:

- Attract the highest caliber of tenure-track and visiting faculty to Montana, further enriching the environment for students at all levels;
- Foster and increase grant activity and research collaborations within Montana, regionally, nationally, and internationally;
- Enrich the research opportunities and infrastructure on each campus, including those available to undergraduate and master's students in related fields;
- Accelerate implementation of the cost-effective and collaborative graduate-education model being pursued by the Montana University Graduate System (MUGS), and potentially become a cost-effective model nationally, where campuses with complementary strengths collaborate to offer shared degree programs that transcend what would be possible on any one campus alone;
- Bring national recognition to the materials science research enterprise in Montana and the MUS;
- Nucleate start-up companies and attract other firms to relocate or expand to Montana. These entrepreneurial ventures will not only enhance local and state economies, they will increase internship and employment opportunities for students and graduates in Montana;
- Be highly cost-effective, with courses and curriculum coordinated across the three campuses, thereby maximizing course enrollments (including those in existing courses serving graduate programs in the many science and engineering disciplines important to MatSci); and
- "..make more efficient uses of resources and …reach critical masses of faculty and students that cannot be readily attained by individual campuses" (AAAS, August 2012, p. 3).

The MUS MatSci Ph.D. curriculum is designed to be flexible, but still provide students with an exceptionally strong and broad understanding of the theory, experimental techniques, current challenges, and societal/economic impacts of materials science and engineering. The program's

learning goals for all students—regardless of specialty—are to understand materials and the full suite of characterization and analysis tools commonly used in materials research. Specific learning goals are for students to understand how classes of materials derive their properties from the atomic to the macroscopic level; be familiar with the growing set of materials fabrication, assembly, processing, and characterization tools and techniques; be aware of and committed to the professional and ethical standards of the field; be knowledgeable about the economic, societal, and other broader impacts of materials and materials research; and to demonstrate through their dissertation research, that they can conceive, plan, design, conduct, analyze, defend, publish, and communicate original and creative research that advances understanding in an area important to MatSci.

4. Market

The market for the proposed MatSci Ph.D. program includes prospective students as the direct market and employers of prospective graduates as an indirect market. With respect to the latter, about one-third of Montana's non-agricultural employment depends strongly on materials, while most of the remaining business/employment sectors are weakly dependent on materials (see Figure 1). Moreover, universities with leading materials R&D capacity and programs tend to both nucleate and attract materials intensive, high-tech commercial enterprises to their communities.

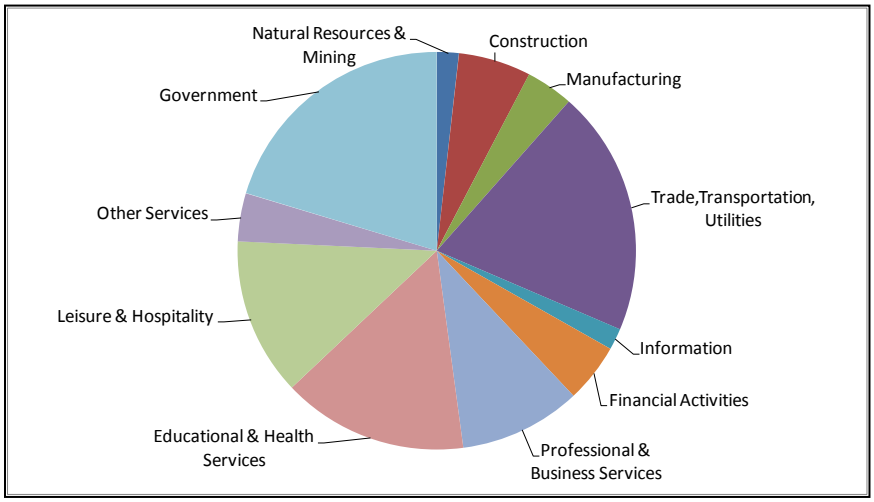


Figure 1. Pie Chart showing the distribution of Montana's non-agricultural workforce of 436 thousand in October 2012 as a function of employment sector. *(Downloaded 29 December 2012 from http://www/ourfactsyourfuture.org/?PAGEID=4&SUBID=155)*

The student market includes bachelor's and master's degree-holders in physics, chemistry, materials science, polymer science, ceramics, mechanical engineering, materials engineering, metallurgy, bioengineering, life sciences, and related fields. Recent graduates from Montana universities, recent graduates from outside Montana (some of whom are Montana residents who left the state to pursue higher education), and individuals already in the workforce, especially those located in Montana, who are seeking professional advancement in materials-related fields are all examples of prospective students. Note that with the core coursework and many electives being available via distance learning, the program may also attract interest from and serve bachelor's/master's degree holders outside the state. Currently there are approximately 100 materials science and/or engineering doctoral programs in

the USA and Canada. Only nine of the programs are located in the Pacific Northwest and states bordering Montana, with none in Montana or Wyoming. Materials-focused Ph.D. programs are common among Schools of Mines (being at 11 of the 15 such institutions), and they are available at 32 land-grant institutions, due to the strong base and need associated with the academic expertise and research/service enterprises of those campuses. The proposed MUS program would bring those totals to 12 and 33, respectively, while providing Montanans with affordable access and employment/economic spinoff benefits typical of such programs.

Significant funding has been reserved in Years 1-3 for marketing and recruiting, using approaches in line with the best practices in graduate recruiting. This effort is planned to include a common program web site (linked transparently to all three campus web sites), "name buys," multi-touch outreach, and strong visibility and recruiting presence in the diverse venues where prospective materials doctoral students can be found (as current undergraduates, current master's students, and high-potential employees in materials-based firms, for example). In addition, faculty involved in the program will be empowered to recruit vigorously at the professional conferences in their fields and to spread the word whenever and wherever they present seminars at other universities and in Montana. A pre-launch seminar series is planned, to bring influential thought leaders in the field to Montana during Year 1, and the seminar series will continue as the program grows. As these speakers learn about the program and the capabilities and opportunities at the three institutions, they will spread the word when they return home and visit other institutions.

5. Organization and Management

The collaborative MUS Materials Ph.D. program is designed to be organized and managed as a systemwide asset of the MUS. Figure 2 provides the Organization Chart. Additional details are provided in Appendix V of the Level II proposal. This section emphasizes the multi-campus management aspects of the program.

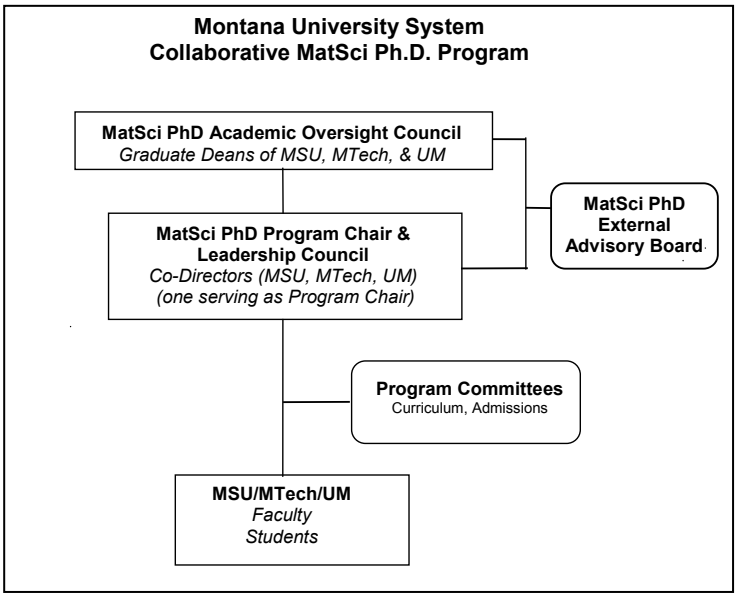


Figure 2. Organization Chart for Proposed MatSci Ph.D. Program

With major participation at Montana State, Bozeman, Montana Tech, and the University of Montana, Missoula, the program will be overseen by the *MatSci Ph.D. Academic Oversight Council*, consisting of the graduate deans of each of the campuses. The Academic Oversight Council and its members resolve issues related to the MatSci Ph.D. program and ensure that the Program complies with MUS and institutional requirements.

Each campus will have a program Co-Director, who is a member of its faculty. The three co-directors together will comprise the *MatSci Leadership Council.* One of the three Co-Directors will be the *MatSci Ph.D. Program Chair.* The Chairperson chairs the *Leadership Council,* while the other two co-chairs each head one of the two standing committees of the program (*The Curriculum Committee* and the *Admissions Committee*). The Program Chair has responsibilities typical of program chairs, including course scheduling across the campuses, advised by the other co-directors. Campus *co-directors* direct the program on their campuses, serve as the primary academic coordinator with the other campuses, and collectively and cooperatively provide leadership for the collaborative program. An *External Advisory Board* will consist of outstanding, nationally recognized, diverse individuals, collectively bringing expertise in the scientific theme areas, from materials industry/employers in Montana, and in graduate education at the Ph.D. level. Members will serve staggered renewable 3-year terms.

Program committees will be established, e.g. for curriculum and admissions, as is typically found in a department or program. Some committees will have student members, as appropriate. Each committee will include faculty member(s) from all three institutions. The *MatSci Ph.D. Program Curriculum Committee's* role is to review/approve new course proposals along with modifications to the curriculum and degree requirements. New core courses and curriculum and degree requirements must be approved through the curriculum review/approval process on all three campuses, while new electives would proceed only through the process on the proposing campus.

The *MatSci Ph.D. Program Admissions Committee* will include faculty members from all three campuses. The Admissions Committee member from each campus is designated as the MatSci Ph.D. program admissions representative on that campus. Students would apply to the MatSci Ph.D. program through the graduate admissions process of any one of the three campuses, ideally the campus where they wish to enroll. Each application would be processed in the normal way by the graduate admissions office and forwarded to the campus' MatSci Ph.D. program admissions representative, who shares it with the Admissions Committee. The Admissions Committee reviews the applicants, including the match between the applicant's interest and preferred campus. Admissions recommendations for the Program will be made as they are for all graduate programs, considering the applicant's quality, the availability of financial support, and the availability of willing mentor(s)/advisor(s). For applicants being admitted, the Admissions Committee would let them know if there is a mismatch between their preferred campus and area of interest and allow them to switch, if appropriate. The Program's recommendation on each applicant would then be forwarded for action to the graduate admissions office on the campus where the student is recommended or waitlisted for admission. In the case of students not recommended for admission, the recommendation is returned to the graduate admissions office of the campus where the student applied. Note that effective summer 2013, all three campuses will be using CollegeNet® for their admissions applications and processing. In addition, MUGS is coordinating the migration of all MUS graduate programs to a common, CollegeNet®-based application system by 2015, which will clearly benefit the proposed program and make integration and handling of applications very straightforward.

Every course offered each term will be listed in the course schedule at each campus, indicating the faculty member(s) and lead campus/location for that course. Courses will be taken "in residence" by all Ph.D. students, with registration, billing, and grading done in accordance with the established MUS mechanism and process for students to enroll in courses at other campuses within MUS. Under this mechanism, students register and pay tuition and fees at their home campus.

Students are subject to the academic progress and good-standing policies of their home campus. Each student will have a committee, chaired by a faculty member (the student's advisor) on the student's home campus. The committee will have at least five members, including at least one faculty member from a collaborating campus and one member appointed by the graduate dean of the home campus. The process for approving and establishing the committee membership follows the process of the student's campus, with the final approval provided by the graduate dean for that campus. The role and responsibility of the committee and the timing for its actions will follow the policies of the student's home campus. Students in good standing at the home institution are accepted as being in good standing at all institutions, and they will be allowed to enroll in any courses identified as part of the Ph.D. program at any of the institutions, providing they have the specific prerequisites for that course. Course grading is subject to the grading standards and policies of the institution offering each course. The dissertation process and format follows the standard for the campus where the student is enrolled. All students in the program and their supervising faculty shall have access to library resources and research equipment on all three campuses, equivalent to the access provided to students and faculty at the campus where the equipment and resources are located. Subject to the approval of their committee and the Program Chair, enrolled students would be permitted to switch home campuses before starting their dissertation. Such a switch would be justified, for instance, if the student's interests change and the preferred Ph.D. advisor is located at one of the other campuses, if the advisor leaves, or if there are more suitable research opportunities with financial support (grant funding) at the other campus. Within the Ph.D. program students would have the same flexibility and options spanning the three campuses, as are typically available to a Ph.D. student in a program on one campus.

The Ph.D. program will agree on and offer a standard total financial support package to students in the program, with stipend levels the same on all three campuses. The Board of Regents tuition policy (Policy 940.31) allows campuses to "…set non-resident tuition for graduate research and teaching assistants at 100% of resident tuition." In accordance with BOR 940.31, Ph.D. students with financial support who are graduate research assistants (GRA) or teaching assistants (GTA) would be charged the in-state tuition rate, regardless of their official residency status. The tuition for these students may be covered by each campus with some combination of waivers, grant funds, and other funds (institutional fellowships, endowment income, industrial funding, etc). Fees are the responsibility of the student and follow the policies and rates of the home institution. In accordance with the current policies at all three campuses, financial support is reserved for students enrolled for 6 or more credits in an academic term. Financial support and the tuition reduction provided through BOR 940.31 would normally be limited to a maximum of 12 semesters of enrollment for each student.

6. Budget Detail

This section summarizes the detailed budget analysis and business plan for the start up of the program and when it is in full operation, serving a student population in the range of 50 to 70, similar to the top-ranked programs. Table 1 provides a budget summary for a projected start-up period of four years,

during which the enrollment is projected to grow from zero to 25 students. This budget analysis is identical to the one included in the Level II submission, which has been reviewed thoroughly on all three campuses. The revenues and expenditures are in balance, even allowing for significant investment in the research infrastructure and capacity at Montana Tech.

Table 1. Summary Resource Analysis and Projection for MatSci Ph.D. Program Start Up

Academic Year	2014	2015	2016	2017
Enrollment	0	7	16	25
Faculty (FTE)	42 (3)	45 (7.5)	45 (12)	45 (17)
PROJECTED REVENUE	$516 K	$1,174 K	$1,676 K	$2,193 K
New Grant funding for Student Support (Tuition included)	0	$350 K ($42 K)	$800 K ($96 K)	$1,250 K ($150 K)
Internal Reallocations	$206 K	$494 K	$516 K	$543 K
New Revenue: MTech-Private fundraising & State	$310 K	$330 K	$360 K	$400 K
PROJECTED EXPENDITURES	$516 K	$1,174 K	$1,676 K	$2,193 K
Faculty costs: new and buyouts	$48 K	$348 K	$396 K	$444 K
Student Costs (stipends, tuition, research, summer symposium)	0	$406 K	$982 K	$1450 K
Course Development for Distance Delivery	$84 K	$84 K	$56 K	$28 K
Program Development & Administrative Support	$134 K	$136 K	$116 K	$111 K
MTech Research Infrastructure Investment	$250 K	$200 K	$180 K	$160 K

Projected Expenditures

a. Faculty. Because the 40+ faculty members planning to participate in the program are already committed to other programs, the three provosts have each committed to hire one new faculty member for the new program, and to provide funding to support adjunct faculty to fill teaching needs in existing programs that would normally be met by the existing faculty. The new faculty are projected to be recruited in Year 1 (2014) and to assume tenure-track positions in Year 2 (2015). At Montana Tech, where teaching loads are higher, additional funding has been budgeted within this line to reduce the teaching obligation for each faculty FTE involved in the materials Ph.D. program from four courses per term to two courses per term. This reduction would be accomplished most economically by finding qualified adjunct/part-time instructors to teach some courses in these faculty members' programs. Funding for adjunct faculty in Year 1 (the planning year) is estimated for one course buyout each semester at UM and MSU and four courses of buyout each semester at MTECH, to allow for planning and recruitment, program administration, and the MTECH faculty to accelerate their research and proposal writing. The same level of course buyouts are budgeted in Year 2 (2015) to allow the core courses to be taught and continue to allow the MTECH faculty involved to place additional attention on their research programs and grants. In Year 3, the funding for course buyouts doubles, so that specialized electives can be taught, along with the core courses, without harming the course offerings for other programs. By Year 4 (2017) the buyout budget is estimated to triple.

b. Distance Delivery of Courses. Because the new core courses and some electives need to be available for distance delivery, the provosts have committed to dedicate some existing curriculum design effort and funds for faculty stipends to accelerate the availability of these courses for on-line delivery. Each campus is responsible for and has in place the faculty expertise to develop two of the six core courses in Year 1 (2014) before the first students matriculate. The typical faculty stipend for distance conversion of a course is $3,000, and a full-time curriculum designer can typically support the development of at least six courses over the year. In addition, over the first few years, some existing and new graduate electives applicable to the theme areas of the program will be developed or adapted for distance delivery. The budget projection includes funding for curriculum design support and faculty stipend to prepare six electives in Year 2 (2015), four in Year 3, and two in Year 4 (totaling 6 core courses and 12 electives), after which the effort is planned to continue as part of the routine ongoing distance-conversion activity budgeted on each campus.

c. Cost of Education and Financial Support for Students. The resource requirements per graduate student are estimated to average $58 K per year. This amount is based on a GTA/GRA plus doctoral stipend totaling $24 K per year, funding to cover resident tuition ($6 K), and funding for the student's research supplies/costs/travel ($28 K). The $28 K per student average includes budget for the annual Summer Symposium, which will bring together in one place the faculty and students from all three campuses. Although summer symposia are not normal for doctoral programs, the faculty have included this face-to-face event as a mechanism to create and reinforce program identity and cohesion, and to allow the students and faculty to get to know each other, network, stay abreast of progress, and advance collaborations among the three campuses. The $28 K per student per year overestimates the cost for first- and second-year students who have not started their research; however these students will be taking more courses, with a significant fraction of these courses incurring distance-learning expenses for the sending and receiving campuses (about $4,800 per course in total).

It is assumed that the $58 K per year is covered by a combination of GTA, tuition waivers, and revenue from grants and contracts ($50 K/year). **Because the ability to fund these per-student expenses is so critical to the quality of the program, the budget projection is based on a requirement that for every admitted student, the faculty must have in hand approximately $50 K of grant/contract revenue per year allocable to these expenses.** Thus, the number of students and the cost of the program linked to enrollment would be automatically regulated by the success of the faculty in securing grants, with revenues and expenditures balanced. This requirement will incentivize faculty to obtain grants, keep the program fiscally solvent, and provide the external resources needed to create and maintain the forefront research infrastructure and activity necessary for the program to become competitive and sought-after by students. This approach to program admissions is typical of successful graduate programs in science and engineering across the country.

d. Administrative Support, Program Development, Recruiting, and Marketing. The administrative support and program-development/recruiting are projected to consist of one FTE of administrative support shared by the three campuses plus a modest budget for administrative operational expenses, typical of similar departments and programs, growing from $18 K in Year 1 (2014) to $35 K in Year 4. Operational costs include funding to support meetings of the External Advisory Board. About $80 K is budgeted in Year 1 (2014) and $75 K in Year 2 for operating expenses associated with program development, recruitment, and marketing, and new library acquisitions. These start-up funds are expected to decline to $40 K in Year 4 (2017). Subsequently these efforts would be expected to continue at a level comparable to ongoing recruitment/marketing of typical graduate programs. Within

this total is $25 K per year for library database/e-journal acquisitions for materials science/engineering. The Library Deans identified $19.7 K to be needed for key information resources required for this program and not already available in the collections of one or more of the libraries, and the $25 K allows for a modest further addition of specific e-journals, print publications, and/or databases.

e. Infrastructure enhancements at Montana Tech. As noted by the AAAS Panel, infrastructure enhancements are needed at Montana Tech to reach the level required for doctoral education. Montana Tech plans to invest $160 K per year in these enhancements on a continuing basis, with an additional $150 K spread across the first three years (2013-2016). These infrastructure enhancements will include research instrumentation and equipment and technician support, optimized for the MatSci Ph.D. program but benefiting many programs and faculty—both graduate and undergraduate.

Projected Revenues

a. Grant Revenue Per Student. A major financial planning assumption for the MatSci Ph.D. program is that **for every admitted student, the faculty must have in hand $50 K of grant/contract direct revenue per year allocable to these expenses.** Thus, the program's enrollments and costs cannot increase faster than the grant revenues available. This funding will cover the student's research expenses, travel, professional development, and in-state tuition. For this analysis, in-state tuition is assumed to be $6,000. Since this amount is equal on the revenue and expenditure sides, the assumed amount does not affect the analysis overall. Not included in the analysis is any other funding in the grant (e.g. for faculty summer salaries, equipment, indirect costs, technicians, undergraduate researchers, or post-doctoral fellows).

b. Internally Reallocated Funds. Each campus has committed to reallocate a modest amount of funding or effort to the MatSci program. Such internally reallocated funds include the salary/benefits for the new tenure-track faculty member, funds for faculty stipends for distance delivery, the salary/benefits for the curriculum design specialist (assumed at one-third FTE per campus in Years 1 and 2), salary for administrative support for the program (assumed at one-third FTE per campus each year), and the routine operating costs for the program. In addition, Montana Tech would invest its graduate program development funds in this program during the start-up phase. Because the MatSci program is so multidisciplinary, and because faculty involved in the program are also affiliated with other programs and departments, these investments will also benefit other graduate programs, improve research competitiveness, and enhance instruction more broadly.

c. New Revenue Sources. The new revenues included in the analysis include private fundraising of an endowment for the program at Montana Tech, along with new funds appropriated by Montana's legislature for doctoral programs at Montana Tech. In November 2012, the Board of Montana Tech's Foundation endorsed a fundraising focus on Excellence in Graduate Education in the context of a larger campaign themed "Impact for Excellence." The goal is to raise at least $2,500,000 for this program over 4 years from private-sector entities and individuals, such as the stakeholders and supporters listed in the first two sections of Appendix II of the Level II Submission (included as Appendix I of this Business Plan). This endowment will provide $100,000 in annual revenue for the program in perpetuity, based on a 4% annual return. The Montana Legislature appropriated $300 K/year for the current biennium, and continuation of this funding is included in House Bill 2 in the current legislative session.

Budget Assumptions

Fundamental assumption: $50 K of grant funds per year per student is required to be in hand before student is admitted. This assumption guarantees that adequate resources will be available for the student's dissertation research and professional development. Thus, the per-student costs of education are balanced by new grant revenues, which pay for the student's stipend, in-state tuition, and research expenses. This amount was recommended and concurred in by the faculty. The $50K per year does not include grant funds for indirect costs, for faculty release time or summer salary, for equipment, for undergraduate researchers, or for other expenses not directly applicable to the per-student costs of education. An alternative reasonable assumption would provide institutional support of about $35 K for first-year students ($24 K (stipend/GTA), $6 K tuition waiver, $5 K travel/professional development and other costs), who are not doing research yet, but are taking courses. Institutional funding of first year students is the norm in several departments, and it would allow the program to grow faster but would require the campuses to identify funding for these students. Note that the annual grant expenditures for a portfolio of grants supporting an enrollment of ~30 Ph.D. students in five years, including IDCs, equipment, faculty effort, research expenses, travel, and undergraduate student researchers is expected to be in the range of $4 M to $6 M, including about $1 M to $1.5 M in IDCs. This new grant amount represents only a 2% to 3% increase on the collective annual base of R&D expenditures of the three campuses combined—a modest and achievable amount compared with the average annual growth rate of 3% to 4%.

Other assumptions:

- In state tuition is estimated at $6,000 per year, paid by research grants or tuition waivers. The current in-state tuition rates are as follows: MSU $6,150, MTech $5,800, and UM $5,850.
- All students will hold GTA/GRA appointments, thus all are eligible for resident tuition per BOR policy 940.31. [If some students do not hold GTA/GRA appointments and they or their employers pay their tuition, the revenues would be increased, but not the expenditures.]
- No assumptions have been made regarding the amount of start-up costs for new faculty. Each campus covers the expenses related to its faculty, courses, students, etc., including faculty start-up expenses. Each campus has its own processes, standards, and resources regarding faculty start-up costs, which are typically spread over three years and vary by discipline and level, ranging typically between $100 K and $600 K per tenure-track position. Because the MatSci program is very multidisciplinary, it cannot be predicted what the discipline of the hire will be or what mix of theorists (generally lower start-up) and experimentalists will be hired. Moreover, every time a faculty member is hired—whether a new position or a replacement—start-up commitments are made. The start-up costs have been committed by the provosts, but they are not included in this analysis.
- No assumptions have been made about grant support for undergraduate student researchers, faculty summer salary, equipment, or indirect costs associated with the new grants. These new grants will bring additional resources of these types and IDC revenues to the campuses. These revenues will be a significant financial benefit, not quantified or included in this analysis. Typically programs benefit from reinvestment of a portion of grant IDCs and grant funding for faculty release-time, and this possible revenue stream, which would be positive for the program's financial picture, has not been included in the analysis.
- No assumptions have been made about how other graduate elective offerings and their schedule might change as the new courses for the MatSci Ph.D. program come on line. Very likely, the core courses and electives in this program will be of interest and value to doctoral and master's students in other, closely related programs. No assumptions have been made about

whether or how many of the MatSci Ph.D. students will enroll in existing graduate courses, thereby increasing their enrollment and cost effectiveness.

7. Program Assessment

Benchmarks and assessment measures have been identified for the program to track and report the achievement of the program's goals and objectives and the value returned to Montana. The Benchmarks are based on factors identified in the National Research Council's 2010 assessment or research doctoral programs in the United States, and additional description is provided in the Level II submission. Table 2 summarizes the benchmarks and measures.

Table 2. Benchmarks[1] and Assessment Measures for the Proposed MatSci Ph.D. Program

Assessment Measures	NRC Assessment*		MUS Proposed Program	
	Top 20 programs	Bottom 20 Programs	Year 1: 2014/15	Steady State Goal (10 yrs)
Program Ranking (R Ranking, 5th Percentile)	Top Quartile	Bottom Quartile	N/A	Top 50% in ~10 years
Publications/FTE Faculty/Year	5.13	1.65	2	>3
Percent of peer-reviewed pubs with PhD student as first author	N/A	N/A	10%	>50%
Average citation per publication	2.25	1.21	N/A	>2
Percent of faculty with grants	91%	85%	60%	>90%
Percent of multi-PI grants with co-PIs from > one campus	N/A	N/A	10%	>35%
Allocable grant $ per FTE student	N/A	N/A	>$50K	>$50K
Percent of first year students with full financial support	91%	74%	>85%	>85%
Percentage completing in <6 years	59%	55%	N/A	>60%
Median Time to Degree	4.92	4.39	N/A	<4.8 years
Average No. Ph.D. Graduates/year	12.9	2.9	N/A	10
Minimum number of course credits taken at non-home institution	N/A	N/A	at least 9	Larger of 9 or 20%
Collects and analyzes post-graduation employment information	60% of Programs	30% of Programs	N/A	Yes
Percentage of first-year students w/ external fellowships	10%	9%	0%	10%
Number of enrolled students	98	19	7	60
Average first year enrollment	19	5	7	15
International students as percent of total students	52%	67%	<75%	<60%
No. of professional development student activities (out of 18)	17	16	16	18
No. of materials-based start-up companies and relocations to MT	N/A	N/A	N/A	TBD

[1] National Research Council (2010), J. Ostriker, et al, editors, "Data-Based Assessment of Research Doctoral Programs in the United States." The NRC does not endorse specific numerical rankings. However, the "top quartile" and "bottom quartile" approach discriminates between programs of consistently different quality and productivity.

8. Impact of Montana Tech's Participation in the Proposed MatSci Ph.D. Program

The proposal for the collaborative MUS MatSci Ph.D. program requires two decisions by the MUS Board of Regents: (1) whether to approve the program, and (2) whether Montana Tech, which is not yet authorized to award doctoral degrees, will be authorized to do so for students in this program, whose research and specialized coursework are conducted under the supervision of Montana Tech faculty. This section addresses the impacts, costs, and benefits of Montana Tech's participation in the program and possible authorization to award this degree.

Montana Tech is an essential institutional member of the proposed collaborative MatSci Ph.D. program. With its tradition and continuing role as the school of mines for Montana, Montana Tech has distinctive materials-related expertise vital to the continuing importance of natural resources to the future economic and environmental well being of the state of Montana and its people. Because of this distinctive expertise in metallurgy, materials processing, geomaterials, and associated fields, any materials Ph.D. program in Montana needs Montana Tech to be involved. Because of this distinctive expertise and Montana Tech's associated research infrastructure, already a few students in Ph.D. programs at MSU and UM perform their dissertation research at Montana Tech and benefit from significant doctoral-level supervision by Montana Tech faculty. Given the breadth of materials science and the program's specific theme areas that are most important to Montana, Montana Tech's participation is even more essential to the proposed MatSci Ph.D. program than it has been to the existing doctoral programs, where UM and MSU students with specific interests are sent to Butte for their dissertation research.

Given that the program needs Montana Tech's expertise, it could be structured either with Montana Tech being an equal degree-granting partner or as a non-degree granting partner. There are many advantages to Montana and other important constituencies of Montana Tech being a full, degree-awarding partner in the program.

1. Montana and MUS will benefit:

- The MatSci Ph.D. program will foster more intensive collaboration among the three campuses and with private entities across the state.
- Montana will become more attractive to high-tech, materials-based industry, creating jobs that allow more Montanans to work in the state after graduation, contributing to economic growth in Montana.
- Montana will become more attractive to prospective graduate students nationally and internationally who are seeking advanced degrees. Figure 3 compares Montana with other similar or nearby states in a few higher-education-related parameters. Montana is near the bottom in average income, undergraduate enrollment, graduate enrollment, and graduate degrees awarded, and in the middle of the pack for total R&D expenditures and educational attainment. These measures are normalized for state population.
- Montana and MUS will be able to capitalize more extensively on the significant distinctive materials-related expertise already at Montana Tech.
- Montana will join the ranks of competitor states (Arizona, Colorado, Idaho, Missouri, New Mexico, Oregon, South Dakota, Texas, and Utah) by having <u>at least</u> three different universities with doctoral programs.
- This program directly supports the MUS Board of Regent's Strategic Plan, especially its goals for Workforce/Economic Development (Increase R&D expenditures, Increase the number of graduate

students, Increase graduate degree production in STEM fields), and overall system Efficiency and Effectiveness.

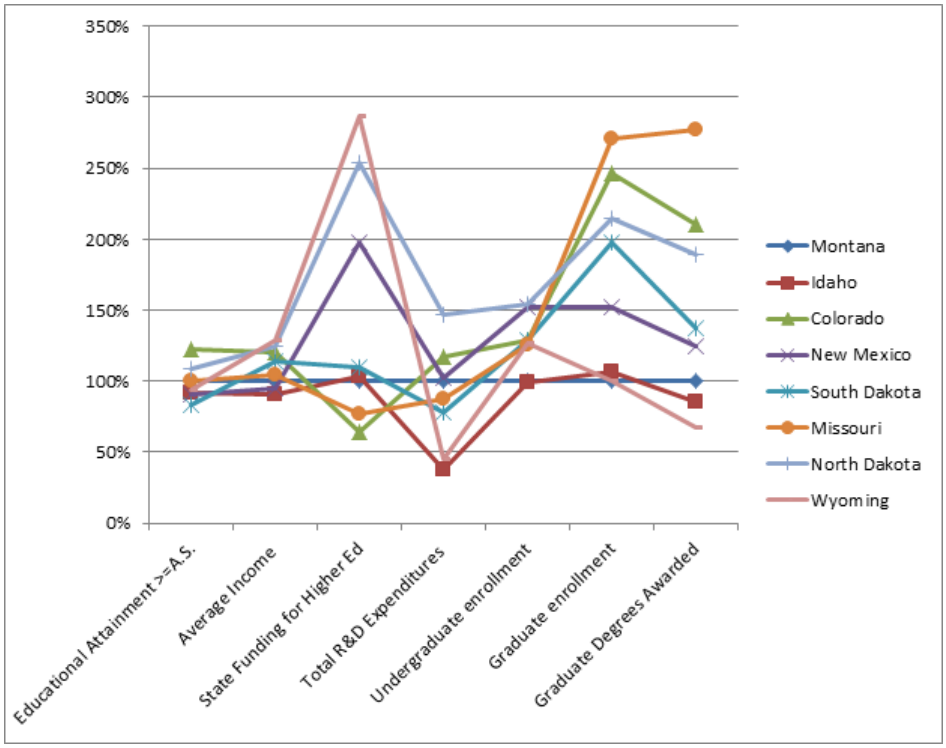


Figure 3. Comparison of Several States with Montana (100%) in Higher-Education Parameters

2. Montana Tech's undergraduate students will benefit.

- On-campus and collaborative research opportunities will increase for undergraduates.
- New research equipment for the Ph.D. program will also benefit existing programs and undergraduate research.
- New faculty will enrich the mentor pool and expertise base for undergraduates.
- The Material Science PhD will open up opportunities to a wide array of students across the campus. Chemistry, Biology, and Engineering faculty all have expressed an interest in participating in this program and it will invigorate the research activities and courses in these disciplines.
- Montana Tech's undergraduates will be in an environment providing greater exposure to research and networking/mentoring from near-peer graduate students who are working on their doctorates. This influence will help the undergraduates aim high, as they plan their educational and career goals and trajectories.

3. Montana Tech will benefit as an institution of higher education:

- Campuses that have PhD programs are held in higher esteem. This benefit is likely to improve Montana Tech's appeal to undergraduate students, as well as to the quality of the educational experience and awareness of career pathways provided to undergraduate students.
- A PhD program at Tech will allow the campus to recruit faculty from an expanded pool of applicants. Prospective faculty with strong commitment to teaching and research have chosen not to apply for or accept positions at Tech, because Tech lacks a PhD program.

- The Ph.D. program will help improve the campus infrastructure, in the form of a new distance classroom, new/improved laboratory space(s), forefront research instrumentation, and enriched seminar/colloquium activities. These investments will benefit all graduate programs, many graduate students in these programs, and undergraduate programs as well.
- The Ph.D. program will improve Montana Tech's grant competitiveness and bring additional extramural (mostly Federal and private) funding to campus, simultaneously increasing indirect cost revenues, research funding, and competitiveness for other grants.
- The PhD will make our degree inventory more in line with our peer institutions: Colorado School of Mines, New Mexico Tech (NMT), South Dakota School of Mines, and the Missouri University of Science and Technology—all of which offer Ph.D.s. In fact, currently Montana Tech is the only one of the 15 universities originally established as a school of mines which is not permitted to offer Ph.D. programs. The lowest number of doctoral degrees offered at these institutions is seven (SDSMT and NMT), and as a result Montana Tech's portfolio of federal research and development funds is only about 20% of SDSMT's (the second lowest funding).

4. Montana Tech's faculty will benefit:
- They will have increased research opportunities, increased funding opportunities, and gain credibility by being formally involved in doctoral-level education.
- Opportunities for collaboration with leading research groups and individuals across the nation will increase, because Ph.D. students will be available to participate in these projects.
- The research productivity, publications, and grant competitiveness of Tech faculty involved with the program will increase, due to the efforts of the doctoral students and the lower teaching workload of these faculty.
- The faculty involved will have improved opportunities for professional recognition and for gaining the professional credit that accompanies being a Ph.D. supervisor.

5. Butte and the Surrounding Community will benefit:
- New faculty and Ph.D. students will move to town and purchase or rent a home, send children to local schools, shop locally, etc.
- Ph.D. programs—especially in economically relevant fields, like materials science—tend to nucleate spin-off companies and attract high-technology business.

The following paragraphs consider the differential costs associated with whether Montana Tech awards the degree or does not.

If Montana Tech were to participate as a non-degree granting partner in this collaborative program, what costs in this proposal would be reduced? Montana Tech faculty and facilities bring distinctive expertise to the program, especially in materials processing, but also in other areas. Distinctive materials-related research infrastructure at Montana Tech would still need to be maintained and continuously updated at a standard that keeps it state-of-the-art. To replicate this infrastructure and the faculty expertise at one of the other campuses would be far more costly. Montana Tech faculty would still need to teach courses in the program, be the *de facto*, if not the official, dissertation supervisors and committee chairs. They would still need to serve on dissertation committees, attend summer meetings of the program, configure courses for distance delivery, and become more active in research and in grant-seeking than many currently are. They would not gain the professional advantage of serving as official Ph.D. advisors for students, and they would continue to have a disadvantage in grant-seeking, as reviewers conclude that the research being proposed would not be viable since Montana Tech would

be perceived to lack the Ph.D. students to perform much of the research. The only reduction in costs might result from small administrative economies associated with the admissions process, which would involve coordination among two rather than three campuses. These savings are likely to be less than $2,000 per year.

Suppose Montana Tech participates as a degree-granting partner, what additional costs and benefits would be experienced? Montana Tech would need to notify its regional accreditor, the Northwest Commission on Colleges and Universities (NWCCU), about the substantive change associated with granting Ph.D. degrees. This cost would be the small one-time amount, of less than $1,000, to draft and submit the letter. Note that the accreditors are already planning a mid-accreditation campus visit within the next year or so, and the additional possible discussions associated with this substantive change would have a negligible impact on the duration and cost of this visit. Another expense would be associated with purchasing the parchment paper, printing the degrees, and providing the graduates with Ph.D. holders for these degrees. This continuing cost would not commence until the first student graduated (possibly as early as Year 4 for a student entering with a Master's degree, but more likely around Year 6). Although this would be an incremental cost for Montana Tech, it would not affect the overall cost to MUS of the program, as either UM or MSU would need to print the degrees for these graduates. Finally, the nominal workload of faculty members at Montana Tech would not change as a result of it being allowed to offer the Ph.D. Although Montana Tech must reduce the teaching assignments of the faculty directly involved in the program, this reduction will not apply to other programs and its cost is estimated in the resource analysis. They would need these course reductions to supervise the Ph.D. students doing their research on campus. Moreover, as time goes on, these faculty will be expected to be accountable for bringing additional research funds to campus—funds which will partially or fully support the lowered teaching loads in the long run. The incremental cost is likely to be less than $1,000 in Year 1 to notify NWCCU and update Montana Tech's institutional accreditation. Once students start to graduate, Montana Tech would need to incur the costs of printing the diplomas, but these costs would not be incurred by UM or MSU, where the students would otherwise have graduated, so there would be no net costs to MUS. The financial benefits and revenue increases with Montana Tech being a full partner in the Ph.D. program are considerable as described above but not amenable to accurate projection.

Concern has been expressed about Montana Tech becoming a doctorate-granting institution, and losing its status as a "primarily undergraduate institution" and as a "master's institution." Even with approval to award the MatSci doctoral degrees, Montana Tech would not become a doctorate-granting institution in the Carnegie Classification or according to the National Science Foundation (NSF).

NSF's threshold for an institution being considered Ph.D. granting is that it must award an average of at least 10 Ph.D. or D.Sc. degrees per year in all NSF-supportable disciplines combined. Carnegie classifies an institution as doctorate-granting if it awarded at least 20 research doctorates in 2008/09. Even with the ability to award Materials Science Ph.D. degrees as an equal partner in the MatSci Ph.D. program, Montana Tech will fall far short of awarding a sufficient number of Ph.D. degrees each year to reach this threshold. The South Dakota School of Mines and Technology, for example, has offered doctoral programs for several years, and it is currently authorized for seven different Ph.D. specialties. Nonetheless, as a result of low degree production, its Carnegie Classification is "Special Focus Institutions—Schools of Engineering." In the five years from FY2008 through FY2012, SDSMT awarded a total of 26 Ph.D.s—well below the Carnegie threshold for doctoral classification—with the highest annual degree production being eight degrees in FY2011.

NSF Definitions of Ph.D. Granting Institutions and Predominantly Undergraduate Institutions:

- "Non-Ph.D.-granting institutions of higher education are accredited colleges and universities (including two-year community colleges) that award Associate's degrees, Bachelor's degrees, and/or Master's degrees in NSF-supported fields, but have awarded 20 or fewer Ph.D./D.Sci. degrees in all NSF-supported fields during the combined previous two academic years."
- ""Predominantly undergraduate" institutions include U.S. two-year, four-year, masters-level, and small doctoral colleges and universities that (1) grant baccalaureate degrees in NSF-supported fields, or provide programs of instruction for students pursuing such degrees with institutional transfers (e.g. two-year schools), (2) have undergraduate enrollment exceeding graduate enrollment, and (3) award an average of no more than 10 Ph.D. or D.Sc. degrees per year in all NSF-supportable disciplines. Autonomous campuses in a system are considered independently, although they may be submitting their proposals through a central office."

Carnegie Classification Definitions of Doctoral-Granting Universities:

- "Doctorate-Granting Universities. Institutions were included in these categories if they awarded at least 20 research doctorates in 2008-09. First professional and Professional doctoral degrees (J.D., M.D., Pharm.D., Aud.D., DNP, etc.) were not counted for the purpose of this criterion. Institutions which granted fewer than 20 research doctorates can be identified by using Custom Listings to intersect categories of the Basic and Graduate Instructional Program classifications. As in previous editions, these categories were limited to institutions that were not identified as Tribal Colleges or Special Focus Institutions." (Source: http://classifications.carnegiefoundation.org/methodology/basic.php)
- Level of research activity. Doctorate-granting institutions were assigned to one of three categories based on a measure of research activity. It is important to note that the groups differ solely with respect to level of research activity, not quality or importance. The three categories are RU/VH: Research Universities (very high research activity), RU/H: Research Universities (high research activity), and DRU: Doctoral/Research Universities.

9. Conclusion

The proposed collaborative Ph.D. program in MatSci would fill an important need in Montana, is thoroughly planned, has addressed the concerns raised by the review panel convened by the American Association for the Advancement of Science in August 2012, is enthusiastically supported and approved by the three participating campuses, has a conservative and financially viable business plan, and would contribute positively to Montana and to the accomplishment of the strategic goals of the MUS and the participating campuses. The financial aspects of allowing Montana Tech to be a full partner in the program, authorized to award the degree, are positive. Costs associated with allowing Montana Tech to grant the degree are negligible, and the potential financial, system, institutional, and other benefits are significant but cannot be quantified accurately. Montana Tech, even with authorization to award this Ph.D. degree would not join the ranks of "doctoral institutions."

Appendix I
Appendix II from Level II Submission: Representative Stakeholders and Likely Sponsors

In-State Industry

John Krstulich, GT Solar, Missoula
Tom McIntyre, REC Silicon, Butte
Jim Liebetrau, AFFCO, Anaconda
Craig Wilkins, Zinc Air, Inc., Kalispell
Dan Brimhall, American ChemMet, Helena
Bert Robins, SeaCast, Butte
Arif Karabeyoglu, AeroTec, Butte
Gary Rivenes, Cloud Peak Energy
Jaye T. Picketts, Rare Element
Peter J. Simonich, PPL Montana, LLC
Jeff Ruffner, MSE-TA, Butte
Larry Twidwell, Montana Enviromet, Butte
Hugh Craig, Polymeric Interconnect, Butte
Lawrence Farrar, Resodyn Corporation, Butte
David Briggs, Purity Systems, Inc., Missoula
Don Kiely, Rivertop Renewables, Missoula
Don Profota, Lattice Materials, Bozeman
Hank Rawlins, Montana Process Engineering, Butte
Tom Russell, Emission Resource Group, LLC
Yuval Avniel, MicroPowder Solutions LLC, Missoula
Todd Johnson, Federal Technology Group, Bozeman
Dave Micheletti, Universal Technical Resource Services (UTRS), Butte
Randy Equall, Scientific Materials Corporation, Bozeman
Howard Bateman, Advanced Materials (Semi-Tool), Kalispell
Tom Hoffman, Summit Aeronautics Group (Boeing Fabrication), Helena

Out-of-State Industry (Based on Known Research Interests or Letters)

Exotic Metals, Kent, WA & Germany
Hercules
REC Silicon, Moses Lake, WA
Bloom Energy, Sunnyvale, CA
Taggart Global, Pittsburgh, PA
Imerys, Sandersville, GA
Boeing Materials, Seattle, WA
Newmont Mining Corporation, Denver, CO
General Electric, Fairfield, CT
Freeport McMoRan, El Paso, TX
Hecla Greens Creek Mining Company, AK
DuPont, Wilmington, DE

State Centers of Excellence

Optical Technology Center (OPTEC), MSU
Spectrum Labs, MSU
Energy Research Institute, MSU
Center for Computational Biology, UM
Center for Biofilm Engineering, MSU
Western Transportation Institute, MSU
Center for Advanced Mineral and Metallurgical Processing (CAMP), MTech

Federal Departments, Agencies and Laboratories Supporting or Performing Materials Science and Engineering Research (Partial Listing):

Department of Defense (DoD)
National Science Foundation (NSF)
U.S. Department of Energy (DoE)
National Institutes of Health (NIH)
National Aeronautics and Space Administration (NASA)
Idaho National Laboratory (INL), ID
Argonne National Laboratory (ANL), IL
Los Alamos National Laboratory LANL), NM
Lawrence Livermore National Lab (LLNL), CA
Oak Ridge National Laboratory (ORNL), TN
Brookhaven National Laboratory (BNL), NY
Sandia National Laboratory (SNL), NM, CA
Lawrence Berkeley National Laboratory (LBNL), CA
Pacific Northwest National Laboratory (PNNL), WA

Appendix F

Additional Evidence for MSU Self-Study

	Documents in Box Folder "Additional Evidence for MSU Self-Study"		
Folder	**Subfolder**	**file name**	**document content**
MSU Tearsheet		MSU tearsheet for 90 day accreditation notice	MSU accreditation notice tearsheet
Eligibility Requirements	ER1	Montana Board of Regents.pdf	MUS governance and administration structure
Eligibility Requirements	ER1	Montana Colleges and Universities.pdf	MUS universities and Colleges
Eligibility Requirements	ER1	Montana Constitution, Article X, Section 9.pdf	Constitution of MT Article X, Section 9 Boards of Education
Eligibility Requirements	ER3	164-2010-R0914.pdf	BOR Item Approval of MSU Updated Core Themes
Eligibility Requirements	ER3	Mission Fulfillment MSU_MUS.pdf	MUS Mission Review of MSU-Bozeman
Eligibility Requirements	ER4	BOR Policy 205-2.pdf	BOR Policy - Subject: Governance and Organization
Eligibility Requirements	ER5	Discrimination, Harrassment, Sexual Misconduct, Dating Violence, Stalking and Retaliation Policy MSU.pdf	MSU Policy on Discrimination, Harrassment, Sexual Misconduct, Dating Violence, Stalking and Retaliation
Eligibility Requirements	ER24	2016 MSU Consolidated Financials.pdf	Montana State University 2016 Financial Statements - Four Campuses
Eligibility Requirements	ER24	June 2017 Series D Rating Report.pdf	Moody's Investor Service rating of MSU refunding bonds
Eligibility Requirements	ER24	Montana State University_835964_Revised Report.pdf	Ratings for the Montana State Board of Regents revenue bonds issued on behalf of MSU
Standard 1	1.A.1	Core Theme Approval.pdf	BOR Item Approval of MSU Updated Core Themes September 2014
Standard 1	1.A.1	November 17-18, 2011.pdf	MSU Bozeman Mission Approval BOR 2011
Standard 1	1.A.1	Student Demographics AY 2016.pdf	MSU enrollment, persistence, graduation and application requirements
Standard 1	1.A.2	LLC Living Learning Communities.pdf	MSU Living Learning Communities Descriptions
Standard 1	1.B.1	Sept_2014_BOR Minutes.pdf	BOR Item Approval of MSU Updated Core Themes September 2014
Standard 1	1.B.2	Current VPRED Allocation Plan to Colleges.pdf	Research and Economic Development (RED) allocation plan for distributing F&A funds to colleges
Standard 2	2.A.1	CBA NTT.pdf	Non-tenure track faculty collective bargaining agreement
Standard 2	2.A.2	Chancellors; duties and responsibilities.pdf	Montana Board of Regents Policy 205.2.1 Chancellors; duties and responsibilities
Standard 2	2.A.4	Code Of Expectations.pdf	Code of expectations for the Montana Board of Regents of Higher Education

Standard 2	2.A.4	Student Regent Appointment Profile.pdf	Student regent appointment profile
Standard 2	2.A.5	By-laws.pdf	Montana Board of Regents Policy 201.7 By-laws
Standard 2	2.A.5	Security and Law Enforcement Operations.pdf	Montana Board of Regents Policy 1006 Security and Law Enforcement Operations
Standard 2	2.A.6	Commissioner and Board Performance Assessment and Compensation Procedure.pdf	Montana Board of Regents Policy 705.1 Commissioner and Board Performance Assessment and Compensation Procedure
Standard 2	2.A.6	Mission Statements; Montana University University System.pdf	Montana Board of Regents Policy 219 Mission Statements; Montana University System
Standard 2	2.A.6	Procedures for Maintenance of Policies.pdf	Montana Board of Regents Policy 103 Procedures for Maintenance of Policies
Standard 2	2.A.7	Performance evaluation; Presidents.pdf	Montana Board of Regents Policy 705.2 Performance Evaluations; Presidents
Standard 2	2.A.7	Presidents; Appointments.pdf	Montana Board of Regents Policy 205.1 Presidents; Appointments
Standard 2	2.A.7	Presidents; Duties and Responsibilities.pdf	Montana Board of Regents Policy 205.2 Presidents; Duties and Responsibilities
Standard 2	2.A.8	Commissioner and Board Performance Assessment and Compensation Procedure.pdf	Montana Board of Regents Policy 705.1 Commissioner and Board Performance Assessment and Compensation Procedure
Standard 2	2.A.10	Cruzado_Waded_CV.pdf	President Cruzado CV
Standard 2	2.A.11	Adams_Daniel_CV.pdf	Daniel Adams, Director of Office of Audit Service, CV
Standard 2	2.A.11	Babcock_Michael_CV.pdf	Michael Babcock, Chair of Faculty Senate, CV
Standard 2	2.A.11	Bader_Jeff_CV.pdf	Jeff Bader, Executive Director of Extension, CV
Standard 2	2.A.11	Boyer_Charles_CV.pdf	Charles Boyer, Vice President of Agriculture, Dean of Agriculture and Director of Montana Agricultural Experiment Station, CV
Standard 2	2.A.11	Clifton_Kylar_CV.pdf	Kylar Clifton, President Associated Students of MSU, CV
Standard 2	2.A.11	Costello_Leon_CV.pdf	Leon Costello, Director of Athletics, CV
Standard 2	2.A.11	Ellig_Tracy_CV.pdf	Tracy Ellig, Executive Director University Communications, CV
Standard 2	2.A.11	Fastnow_Chris.pdf	Chris Fastnow, Director, Office of Planning and Analysis, CV
Standard 2	2.A.11	Hasenpflug_Cathy.pdf	Cathy Hasenpflug, Associate Vice President and Chief Human Resource Officer, CV

Standard 2	2.A.11	Hayes_Maggie_CV.pdf	Maggie Hayes, Assistant to the President, CV
Standard 2	2.A.11	Kearns_Chris_CV.pdf	Chris Kearns, Vice President for Student Success, CV
Standard 2	2.A.11	Leist_Terry_CV.pdf	Terry Leist, Vice President of Administration and Finance, CV
Standard 2	2.A.11	McKamey_Shelby.pdf	Sheldon McKamey, Executive Director, Museum of the Rockies, CV
Standard 2	2.A.11	Mokwa_Robert_CV.pdf	Robert Mokwa, Provost and Executive Vice President for Academic Affairs, CV
Standard 2	2.A.11	Murray_Christopher_CV.pdf	Christopher Murray, President and CEO Montana State University Alumni Foundation, Bio
Standard 2	2.A.11	Peterson_Kellie_CV.pdf	Kellie Peterson, Legal Counsel MSU, CV
Standard 2	2.A.11	Reijo_Pera_Renee_CV.pdf	Renee Reijo Pera, Vice President for Research and Economic Development, CV
Standard 2	2.A.11	Shaffer_Jyl_CV.pdf	Jyl Shaffer, Director, Office of Institutional Equity and Title IX Coordinator, CV
Standard 2	2.A.11	Sheehan_Jerry_CV.pdf	Jerry Sheehan, Vice President and Chief Information Officer, CV
Standard 2	2.A.14	Prior Learning Assessment (PLA).pdf	Montana Board of Regents Policy 301.19 Prior Learning Assessment
Standard 2	2.A.14	Prior Learning Assessment Expanded Policy Recommendations.pdf	MUS Prior Learning Assessment Expanded Policy Recommendations
Standard 2	2.A.17	Associated student organizations and officers.pdf	Montana Board of Regents Policy 506.2 Associated student organizations and officers
Standard 2	2.A.19	Board of Regents Employment Contracts.pdf	Montana Board of Regents Policy 711.2 Board of Regents Employment Contracts
Standard 2	2.A.19	CBA Graduate Employee.pdf	Collective Bargaining Agreement Graduate Employee Organization of MSU
Standard 2	2.A.19	CBA Montana two-year college faculty association.pdf	Collective Bargaining Agreement Montana Two-Year College Faculty Association
Standard 2	2.A.19	CBA NTT.pdf	Collective Bargaining Agreement Non Tenure Track Faculty MSU
Standard 2	2.A.19	Emloyment Contracts (Non-faculty).pdf	Montana Board of Regents Policy 711.1 Employment Contracts
Standard 2	2.A.20	General Record Retention Schedule Mandate from OCHE.pdf	Montana University System General Record Retention Schedule
Standard 2	2.A.22	GOVERNANCE AND ORGANIZATION.pdf	Montana Board of Regents Policy 203.5.2 Appeals
Standard 2	2.A.23	Code of Expectations.pdf	Code of expectations for the Montana Board of Regents of Higher Education

Standard 2	2.A.23	Conflicts of interest.pdf	Montana Board of Regents Policy 770 Conflicts of Interest
Standard 2	2.A.24	Consulting Services-Faculty.pdf	Montana Board of Regents Policy 401.1 Consulting Services-Faculty
Standard 2	2.A.24	Copyrights.pdf	Montana Board of Regents Policy 401.3 Copyrights
Standard 2	2.A.24	Inventions and Patents.pdf	Montana Board of Regents Policy 401.2 Inventions and Patents
Standard 2	2.A.24	Montana State University Policy on Material Transfer Agreements (MTAs).pdf	Montana State University Policy on Material Transfer Agreements
Standard 2	2.A.24	Ownership of Electronic Course Material	Montana Board of Regents Policy 406 Ownership of Electronic Course Material
Standard 2	2.A.24	University System Employee Equity Interest and_or Business Participation.pdf	Montana Board of Regents Policy 407 University System Employee Equity Interest and/or Business Participation
Standard 2	2.A.26	2015-2017 Level Two Procurement Delegation Agreement.pdf	State of Montana Department of Administration Level Two Procurement Delegation Agreement MSU
Standard 2	2.B.1	Employment Contracts (Non-faculty).pdf	Montana Board of Regents Policy 711.1 Employment Contracts
Standard 2	2.B.1	figure Fall Tenurable Faculty FTE by Funding Type.pdf	Graphs of Trends in Faculty, Staff, Student Enrollment, Retention and Graduation Rates, Degrees Awarded, General Fund Expenditures
Standard 2	2.B.1	MSU KPI 2006-2016.pdf	MSU Key Performance Indicator Data 2006-2015/16
Standard 2	2.B.4	Employment Contracts (Non-faculty).pdf	Montana Board of Regents Policy 711.1 Employment Contracts
Standard 2	2.B.4	figure Fall Tenurable Faculty FTE by Funding Type.pdf	Graphs of Trends in Faculty, Staff, Student Enrollment, Retention and Graduation Rates, Degrees Awarded, General Fund Expenditures
Standard 2	2.B.4	MSU KPI 2006-2016.pdf	MSU Key Performance Indicator Data 2006-2015/16
Standard 2	2.C.1	Academic Program Planning.pdf	Montana Board of Regents Policy 303.10 Academic Program Planning
Standard 2	2.C.1	MUS Academic Affairs Handbook.pdf	MUS Academic Affairs Procedureal Guidebook
Standard 2	2.C.5	Guidelines for Level of Review for Curriculum Changes.pdf	MSU Guidelines for Leel of Review for Curriculum Changes
Standard 2	2.C.5	New_Course_CIM_Process_Flowchart _2015.pdf	Proposing a New Course at MSU Flowchart
Standard 2	2.C.5	Proposing a New Academic Program Flowchart.pdf	Proposing a New Academic Program at MSU Flowchart

Standard 2	2.C.9	General Educartion Transfer Policy; MUS.pdf	Montana Board of Regents Policy 301.10 General Education Transfer Policy; MUS
Standard 2	2.C.9	Operation Rules for MUS Core.pdf	Operational Rules for the Montana University System Core
Standard 2	2.C.11	Gallatin College two-year mission expansion plan.pdf	Gallatin College Comprehensive Two-Year Mission Expansion Plan
Standard 2	2.C.18	Continuing Education; Non-credit Programs.pdf	Montana Board of Regents Policy 304.2 Continuing Education; Non-credit Programs
Standard 2	2.D.1	Developmental Education.pdf	Montana Board of Regents Policy 301.18 Developmental Education
Standard 2	2.D.2	2016 Annual Security_Fire Safety Report.pdf	MSU Annual Security & Fire Safety Report
Standard 2	2.D.3	Admissions Requirements.pdf	Montana Board of Regents Policy 301 Admission Requirements
Standard 2	2.D.4	Academic Program Moratorium and Termination.pdf	Academic Program Moratorium and Termination
Standard 2	2.D.4	Program_Termination_Tutorial_OCHEApproval.pdf	MUS Program Termination/Moratorium Form
Standard 2	2.D.8	General Record Retention Schedule Overview.pdf	MUS General Record Retention Schedule
Standard 2	2.D.14	Proctoring and Exam Administration Policy MSU Online.pdf	Proctoring and Exam Administration Policy MSU Online
Standard 2	2.E.2	LibQUAL_2016_Report.pdf	LibQUAL+ 2016 Survey MSU Libraries
Standard 2	2.E.2	Library Colletion_Development_2016_Annual_Report.pdf	MSU Libraries Collection Development FY16 Annual Report
Standard 2	2.E.2	Library Informatics and Computing.pdf	MSU Library Infomatics and Computing Annual Report FY16
Standard 2	2.E.2	MSU Faculty Survey Report of Findings.pdf	Montana State University Faculty Survey: Report of Findings from the S+R Local Faculty Survey
Standard 2	2.E.2	MSU Library Strategic Plans.pdf	MSU Library Strategic Plan
Standard 2	2.E.2	MSU_Library_Website_Usability_Report_2017.pdf	Usability Report for MSU Library Web Site 2017
Standard 2	2.E.2	ClimateQual_2013.pdf	ClimateQUAL MSU Libraries 2013 Survey
Standard 2	2.E.2	Ongoing Investments and Successes Tied to MSU's Strategic Plan Objectives.pdf	MSU Strategic Plan Investments 2011-12
Standard 2	2.F.1	2016 MSU Consolidated Financials - Final.pdf	Montana State University 2016 Financial Statements - Four Campuses
Standard 2	2.F.1	Biennial Allocation of State Funding to Montana University System campuses.pdf	Montana Board of Regents Policy 970.1 Biennial Allocation of State Funding to MUS campuses

Standard 2	2.F.1	FY 16-17 Tuition and Fees Summary.pdf	MUS MSU Bozeman Inventory and Validation of Fees FY2016 and 2017
Standard 2	2.F.1	Mandatory Fee Descriptions.pdf	MSU Mandatory Fee Descriptions
Standard 2	2.F.4	2016 MSU Consolidated Financials - Final.pdf	Montana State University 2016 Financial Statements - Four Campuses
Standard 2	2.F.5	2016 Operating Budget.pdf	Summaries of MSU-Bozeman Budgets 2016
Standard 2	2.F.5	2017 Operating Budget.pdf	Summaries of MSU-Bozeman Budgets 2017
Standard 2	2.F.7	Montana Single Audit Report 3_15 PDF.pdf	Federal Single Audit, Montana Single Audit Report: For the Two Fiscal Years Ended June 30, 2015
Standard 2	2.F.7	Montana Single Audit Report 10_15 PDF.pdf	Compliance Audit Montana State University: For the Two Fiscal Years Ended June 30, 2015
Standard 2	2.F.7	Montana Single Audit Report June 30_2016.pdf	Financial Audit Montana State University: For the Two Fiscal Years Ended June 30, 2016
Standard 2	2.F.8	MSU and MSUF MOU 2015 0521.pdf	Operating Agreement Between Montana State University and Montana State University Foundation, INC.
Standard 2	2.G.2	Autoclave Quality Assurance Program 2014.pdf	MSU Autoclave Quality Assurance Program
Standard 2	2.G.2	Biohazardous Waste Disposal Chart.pdf	Biohazardous Waste Disposal Chart (MSU Research Laboratories)
Standard 2	2.G.2	Biosafety Manual 2015.pdf	MSU-Bozeman Biosafety Manual
Standard 2	2.G.2	Dual Use of Research of Concern Policy.pdf	MSU-Bozeman Dual Use of Research of Concern Policy
Standard 2	2.G.2	MSU Biological Toxin Policy.pdf	MSU Biological Toxin Policy
Standard 3	3.A.1	Climate Action Plan w Appendices 2011.pdf	MSU Climate Action Plan 2011
Standard 3	3.A.1	Gallatin College two-year mission expansion plan.pdf	Gallatin College Comprehensive Two-Year Mission Expansion Plan
Standard 3	3.A.1	Landscape Master Plan.pdf	MSU Landscape Master Plan
Standard 3	3.A.1	MSU Transportation Master Plan Draft Document.pdf	MSU Transportation Master Plan Draft 2017
Standard 3	3.A.2	MSU Charrette Results 2012.pdf	MSU Strategic Planning Charrette Results 2012
Standard 3	3.A.2	Strategic Planning Committee 2011.pdf	Strategic Planning Committee Strengths, Weakness, Opportunities, Threats (SWOT) Analysis
Standard 3	3.A.4	FY13 Investment Proposal Form.doc	MSU Strategical Investment Proposal for Institutional Priorities Form
Standard 3	3.A.5	Emergencyresponse_adminresponsibility.pdf	MSU Emergency Management Administrative Responsibility

Standard 3	3.A.5	Montana Emergency Response Framework_Base Plan_2012.pdf	Montana Emergency Response Framework (MERF) 2012
Standard 3	3.A.5	Security and Law Enforcement Operations.pdf	Montana Board of Regents Policy 1006 Security and Law Enforcement Operations
Standard 3	3.B.2	CLS five-year hiring plan, FY17-FY21.xlsx	College of Letters and Science 5 year hiring plan FY17-21
Standard 3	3.B.2	COAA hiring plan 2016.docx	College of Arts and Architecture 5 year hiring plan
Standard 3	3.B.2	COE 5 Yr Hiring Plan.xlsx	College of Engineering 5 year hiring plan
Standard 3	3.B.2	College of EHHD Hiring Plan 2016-2020.pdf	College of Education and Health and Human Development 5 year hiring plan 2016-2020
Standard 3	3.B.2	Hiring Plan College of Agriculture	College of Agriculture 5 year hiring plan 2016
Standard 3	3.B.2	JJCBE Hiring Plan.docx	Jake Jabs College of Business and Entrepreneurship 5 year hiring plan
Standard 3	3.B.2	Library-hiring-plan-2016.pdf	Library 5-year hiring plan
Standard 4	4.Access	Gallatin College two-year mission expansion plan.pdf	Gallatin College Comprehensive Two-Year Mission Expansion Plan
Standard 4	4.Engagement	MSU Position Statement on Outreach and Engagement 2013.pdf	MSU Position Statement on Outreach and Engagement
Standard 4	4.Integration	Towne's Harvest Garden.pdf	Towne's Harvest Garden & Community Supported Agriculture Program Annual Report 2015
Standard 4	4.Discovery	2017 MUS IDeA Program.pdf	MUS System Research sponsored by the NIH
Standard 4	4.Discovery	Task Force Summary 2016.docx	Task Force on Strengthening Research and Scholarly Work
Standard 4	4.Learning	Academic Program Planning.pdf	Montana Board of Regents Policy 303.10 Academic Program Planning
Standard 4	4.Learning	AcademicAffairsHandbook.pdf	Board of Regents of Higher Education Academic Affairs Procedural Guidebook
Standard 4	4.Learning	Final Updating Advising Report.docx	Updating Advising Committee Report December 2015
Standard 4	4.Learning	Graduate Assessment Plan template_update_May2017	Outcomes Assessment of Graduate Programs
Standard 4	4.Learning	Montana State University Guidelines for Program Review.pdf	Montana State University: Guidelines for Program Reviews
Standard 4	4.Learning	MUS Suicide Prevention Summit Agenda-Final 2016.pdf	MUS State-Wide Summit on Suicide Prevention 2016 Schedule
Standard 4	4.Learning	New_Course_CIM_Process_Flowchart_2015.pdf	Proposing a New Course at MSU Flowchart
Standard 4	4.Learning	Program Review.pdf	Montana Board of Regents Policy 303.3 Program Review

Standard 4	4.Learning	UPdate Core General Education.pdf	Updating the Core Committee Recommendations
Standard 4	4.Stewardship	Copy of FY17 Base Increases.xlsx	FY17 Strategic Base Budget Increases
Standard 4	4.Stewardship	FY17 Executive OTO Strategic & Results Pool Allocations.xlsx	FY17 One-Time-Only Strategic Pool Recap and FY17 One-Time-Only Results Pool Recap
Standard 4	4.Stewardship	Montana State FY16 Emissions Report Final.pdf	Montana State University FY16 Sustainability Solutions
Standard 4	4.Stewardship	Workload Task Force report final.docx	Faculty Workload Task Force Report 2016
Standard 5	5.A.1	MSU's Strategic Plan Progress Report.pdf	MSU's Strategic Plan Progress Report May 3 2017
Standard 5	5.A.2	Mid-Cycle Report without Appendix.pdf	MSU's Mid-Cycle Report to NWCCU

Appendix G

List of Tables and Figures