THE MISSION OF LYMAN BRIGGS COLLEGE
LBC bridges the sciences and humanities through interdisciplinary teaching and research by
• sustaining an inclusive residential college environment within a major research university,
• fostering collaboration between students, faculty, and staff, to advance scholarship, teaching innovation, and community engagement, and
• inspiring students to become lifelong learners, engaged citizens, and effective leaders.

PROGRESS ON GOALS SET BY THE 2011-12 ACADEMIC PROGRAM REVIEW

Development of learning objectives for the entire curriculum and its sub-components
Each LBC disciplinary group established its desired learning outcomes during 2012-13. We are now linking them to backwards design of assessments within courses – and we are also melding them into college-wide learning objectives to guide further curricular planning.

Strengthening of the Briggs experience through connections with our alumni
LBC has co-hired an experiential education coordinator with Engineering to facilitate alumni mentoring and help our students prepare for diverse careers or post-graduate study.

Increasing recognition of LBC through scholarship and dissemination of our achievements.
Faculty members’ scholarly engagement, grant activity, external prizes, and media attention continue to grow. With support from the Provost, LBC is providing seed funds for new scholarly projects. Our new communications officer is publicizing our achievements, and our new advancement officer is working with UADV to arrange external sponsorship.

ENHANCING THE STUDENT EXPERIENCE
LBC provides an innovative, integrative STEM education to a diverse student body. Our 6-year degree completion rate is 86%, with no significant differences by race or gender. Even better, over 72% of entering LBC students complete STEM degrees at MSU (compared with a 40-50% national average). However, not all students have had equal access to the full Briggs Experience. In particular, freshmen entering with math placements below pre-calculus have historically been less likely to stay in LBC or remain in STEM majors. For the last five years, we have been working to reverse this trend:

- LBC’s INQUIRE Program provides students with lower math placement scores academic support, a peer cohort, targeted courses, and an on-ramp into the mainstream LBC STEM curriculum. The program includes courses in science, mathematics and Tier 1 writing. In 2013-14 we are adding a spring offering of Chemistry 1 and a summer offering of Chemistry 2 to help the INQUIRE cohort catch up with their mainstream peers by the start of sophomore year.

- With support from the Office of the Provost, LBC and EGR have expanded EGR’s ESSA summer bridge program into an LBC-EGR-CNS program with teaching, advising, and peer cohort elements for 50 students. ESSA students flow directly into the academic year programs maintained by the three colleges for their majors (DPO Scholars in EGR; INQUIRE in LBC; Drew Scholars in CNS). Data from the EGR Diversity Programs Office demonstrates that most ESSA students moved up at least one math course level by the end of the program and that the long-term retention of ESSA students in EGR has far exceeded the norm for comparable students without ESSA participation. This program shows a clear
ability to raise MSU’s degree completion rate and reduce the achievement gap between students of different backgrounds. We request that Office of the Provost both renew its support at a level that will enable the program to expand to a capacity of 75 students starting summer 2014 and also fund a new mathematics education faculty position joint between LBC and EGR, to augment these efforts.

- In 2013, LBC co-founded the MSU STEM Education Alliance with CANR, CNS, EGR, BEACON, CEER and Create4STEM to advance our joint interests in promoting the use of evidence-based teaching practices, supporting research related to undergraduate STEM education, and increasing persistence and degree completion – especially for students from groups traditionally under-represented in STEM. This unique group will enable its members to greatly increase their effectiveness both in their own individual STEM education initiatives and in larger initiatives requiring broader collaboration.

LBC’s externally-funded projects that support under-represented populations in STEM are thriving and the college is helping MSU win campus-level grants with similar goals.

- LBC’s NSF S-STEM program supports and mentors students with significant financial need to persist in science majors, undertake research, and pursue graduate studies. LBC’s NSA and NSF REU programs in mathematics give students from under-represented populations intensive research experiences that sustain their dreams of completing degrees in mathematics or related fields. We measure the effectiveness of these programs through participant evaluations, continued external funding, and participant outcomes (e.g., persistence in STEM majors, progression to graduate studies).

- With its Alliance partners, LBC helped MSU win selection as a project site for the AAU STEM Education Initiative, submit an NSF WIDER proposal in summer 2013, and submit an HHMI proposal in October 2013. All of these efforts focus on transforming MSU’s gateway STEM courses to improve STEM degree attainment and reduce achievement gaps among students of different backgrounds, campus-wide. LBC’s existing work with undergraduate learning assistants (ULA’s) and its partnership with EGR (and now CNS) on the ESSA summer bridge program are vital components of these proposals. Each proposal includes a detailed plan to assess the impact of the targeted pedagogical changes on student learning, retention, and STEM persistence.

LBC employs educational technology that augments the active-learning pedagogies used in all Briggs courses. Examples include clickers for in-class exercises, digital video cameras to create YouTube videos for course projects and train ULAs, online drill problems and pre-lecture quizzes to support just-in-time teaching, online survey tools to facilitate student projects, blogging sites to provide continuous engagement in writing, and course websites using Web 2.0 tools for discussions and feedback. Our IT officer leads training workshops, writes a monthly newsletter alerting faculty to hardware and software options, and provides individualized assistance with instructional design incorporating educational technologies.

- To enable LBC to make the leap to offering all classes in studio and flipped format while sustaining several recent educational innovations, the college needs next-generation technology-enabled teaching facilities. LBC faculty have been experimenting with course models designed to boost student engagement and grasp of thematic connections across STEM fields; examples include our successfully piloted interactive ChemConnections course, the proven SCALE-UP version of introductory physics for life scientists, and our
planned BioCore (Wisconsin) model for integrating molecular and ecological biology courses. These powerful models require modern classrooms. LBC requests that a pair of REAL classrooms be created in Holmes Hall, adjacent to our teaching lab prep facilities, so that STEM classes requiring demonstrations and hands-on experiments can be taught in REAL environments. I am working with FPSM to identify a plan for achieving this goal; it will be the focus of the college’s Space, A&I, and TLE requests this year.

LBC has launched a 5-year pilot program to study the benefits of having LBC students satisfy their upper-level IAH and ISS requirements through selected 300-level LBC HPS (history, philosophy, and sociology of science) courses. This removes duplicate requirements aimed at the same liberal learning goals, encourages students to complete the focused, integrative HPS curriculum, and provides LBC students with the flexibility they seek to pursue second majors, academic minors, language studies, study-abroad and undergraduate research. We will evaluate how the program affects students’ attainment of these specific academic goals.

Enrollment in upper-level HPS seminar courses is burgeoning. The college appreciates the enrollment funds granted to open more course sections in 2012-14 and requests that these enrollment funds be made recurring, as the long-term need is supported by seven years of data.

INCREASE RESEARCH OPPORTUNITIES

Within its diverse research portfolio, Lyman Briggs offers two unique and interdisciplinary research areas: history, philosophy, and sociology of science (HPS), and discipline-based educational research (DBER). LBC faculty in all disciplines are steadily increasing their grant proposals to foundations and federal agencies (LBC’s new non-Center funding averages over $4M/year) and they play leadership roles in large-scale efforts such as BEACON, ICER, and the AAU STEM Initiative. Consistent with our educational mission and our drive to improve STEM persistence, we stress student research immersion through multi-week course projects, professorial assistantships, honors seminars, our NSF-funded BRAID, S-STEM and REU programs, and college research awards. With support from the Office of the Provost, LBC organized a May 2012 conference on Interdisciplinary Teaching and Learning – and is presently leading an MSU team that will host the 2014 Annual conference of the Association for Interdisciplinary Studies; such events bring nationally renowned scholars and practitioners to campus and showcase MSU’s many interdisciplinary scholars and educators.

Lyman Briggs is unique in uniting DBER expertise in biology, chemistry, physics, math and statistics within one community that embraces cross-field collaboration on course design and implementation. Our long-standing BRAID program studies how interdisciplinary courses impact student learning; LBC classes are both the laboratories for undertaking these studies and the first beneficiaries of the results. We are also helping to build MSU’s reputation as a national center of DBER excellence: our biology group led a national workshop for biology educators at the 2012 ABLE conference and published three lead articles in a 2013 issue of *CBE-Life Sciences Education*. Lyman Briggs is making several concurrent efforts to increase its strength in DBER research as a college and as part of the MSU community:

a) *Making three new DBER faculty hires* (biology, chemistry and physics) for fall 2014. As mentioned above, LBC and EGR will be requesting support for a new DBER faculty line in mathematics for fall 2015 to strengthen our joint research and diversity efforts.
b) **Co-leading campus-scale grant proposals:** LBC faculty played key roles in MSU’s successful 2013 AAU STEM Initiative proposal, the 2013 NSF WIDER proposal and the 2013 HHMI proposal. These efforts will transform MSU’s gateway STEM courses to improve STEM degree attainment and reduce achievement gaps.

c) **Co-founding the MSU STEM Education Alliance** with CANR, CNS, EGR, BEACON, CEER, and Create4STEM to promote curricular changes, coordinate development of institutionally limited proposals, establish a unified public presence for MSU’s STEM education reform efforts and develop a vibrant, visible community of collaborators working to improve STEM persistence and degree completion -- especially for groups traditionally under-represented in STEM. The AAU STEM Initiative inspired formation of the Alliance; the WIDER and HHMI proposals were its first fruits. The Alliance is now creating a web portal and arranging networking events to plan further joint research ventures.

Markers of success in these efforts will include an increase in grant funding and publications, high-quality recruits for doctoral and postdoctoral fellowships, and invitations for faculty to participate in national initiatives.

Lyman Briggs is home to one of the nation’s largest HPS faculty cohorts; combining this with the campus-wide science studies expertise (including in STEM education), MSU has, perhaps, the strongest science studies concentration in the world. As Briggs’s HPS faculty members move into tenured status, they have become highly productive scholars with externally funded research, often done in collaboration with scientists (e.g., in BEACON). Now, they are organizing their MSU peers into a coherent whole, capable of making a major national impact. This fall, they launched *Science Studies at State [S3]*, a community to undertake joint projects and grant proposals on HPS research, STEM Education, and related fields. S3 has already held its inaugural meeting and established a close working relationship with Create4STEM. LBC is providing financial support for the group’s meetings and will underwrite pilot research projects. In the next 5 years, this new venue for collaborative scholarship should yield an explosion of research grants and high-profile outcomes spanning all areas of science studies and including scholars from STEM and STEM education, as well as HPS fields.

**ENRICHING COMMUNITY, FAMILY AND ECONOMIC LIFE**

LBC is encouraging students to explore an array of STEM majors and careers, rather than focusing solely on medical or veterinary school as many have tended to do. Appreciating the exciting careers open to students with a STEM background can foster persistence and retention, especially for members of groups that are traditionally under-represented in STEM.

- LBC has begun working with The Center for Spartan Engineering to provide LBC students with experiential education opportunities. We are also partnering with Career Services and the College of Nursing to hire a field career consultant.
- Over the past few years we have added several coordinate majors as part of this effort: CANR Food Science, CNS Neuroscience, CNS Actuarial Sciences and CNS Advanced Mathematics. A coordinate major with CANR Crop and Soil Sciences is planned.

We are monitoring the immediate impact (*How many students choose the new coordinate majors? Which experiential or career services do they use?*) and we will also evaluate long-term effects (*Are more LBC students pursuing non-medical careers that use their STEM skills? Are LBC students undertaking active career planning early in their college years?*).
LBC leverages its interactive teaching style and engaged undergraduates in outreach to K-12 students and to the general public. Our primary focus is in Lansing-area public schools (class visits with science experiments) and in Flint public schools (the Briggs Multi-cultural Alliance annually brings 40-60 students and their teachers to experience science and college life at LBC). Faculty members guide Honors Option students in designing and delivering outreach modules; this teaches them that public outreach is an integral responsibility of science careers. LBC faculty and staff also participate in campus outreach efforts like the new MSU Science Festival, Girl Scout Science Day, Grandparents University, and the Planetarium’s public lectures, or launch projects under the Broader Impacts component of funded research. The value of these outreach efforts is confirmed by the longstanding participation of school districts, teachers, and scouting leaders; they help attract a diverse array of talented students to MSU while building public appreciation for our scientific accomplishments.

**STRENGTHENING STEWARDSHIP**

LBC’s Capital Campaign goals were jointly written by the Dean and Advancement Director, and reflect the college’s priorities as given in our strategic plan, Academic Program Review, and annual planning letters. We are primarily seeking endowments for

- **Student scholarships** – enabling students of limited means to pursue STEM degrees
- **Enriched student experience** – making learning assistantships, undergraduate research, and study abroad opportunities available to all students, regardless of their means
- **Teaching innovation** – supporting the equipment, facilities, and stipends that enable faculty to make transformative educational experiments and disseminate the best throughout LBC, MSU, and the STEM education community

LBC staff (especially the IT officer and lab technicians) partner actively with RHS and the Holmes Hall staff to increase recycling, reduce landfill waste, use more energy-efficient lighting and sustainable cleaning materials, conserve chemicals used in teaching laboratories, minimize use of paper documents, re-use furniture and equipment during its full usable life, and transfer unneeded but working furniture and equipment to MSU Salvage.

**EXPANDING INTERNATIONAL REACH**

As both science and culture continue to forge international connections, it is increasingly important for the future leaders of the scientific community to understand science in global context. LBC is taking multiple approaches to help every student develop a more international perspective. Students majoring in STEM fields often find few international opportunities that mesh with their majors. Hence, LBC offers faculty-led study-abroad classes that meet college requirements for the study of science in societal context. These stress inter-disciplinary faculty teams and extra-mural experiences; the international location is made central to the students’ exploration of how culture and history impact science. Briggs faculty members also lead Freshman Seminars Abroad to establish integrative global studies as the first element in a student’s academic and experiential curriculum. Briggs has recently established linkages with The University of Technology Sydney in Australia and is creating linkages with Newcastle University in England and Lund University in Sweden for undergraduate student exchanges in the biomedical and natural sciences. Moreover, our work with the American Semester program brings a strong international student component into Holmes Hall and LBC classrooms. The college increasingly hires faculty with international research programs; several are affiliated
with ISP’s Area Studies Centers or the GenCen. Their scholarly interests impact the sources and approaches used in their teaching, including creation of new study-abroad programs and mentoring of students on research projects with international dimensions. Finally, LBC has made need-based study abroad scholarships a priority for the Capital Campaign.

We will evaluate the success of these efforts by tracking student participation in study abroad, numbers of international students spending a semester (or more) in Lyman Briggs, course curricula with global themes, and student performance on assessments related to international dimensions of their academic programs as part of the college’s learning outcomes.

**ADVANCING OUR CULTURE OF HIGH PERFORMANCE**

LBC uses best practices from MSU’s ADVANCE/ADAPP project in recruiting and retaining a diverse workforce. Our FEA collaborates with every search committee and helps junior faculty assess their progress toward tenure; our advertising materials emphasize the role of inclusive excellence in our college’s work and are placed in media accessible to diverse audiences; our application materials, campus visits, and offer process are transparent and standardized to avoid bias. The college has also been successfully pursuing targets of opportunity.

To continue improving our recruitment and retention processes, and our ability to support work-life balance, we are piloting several new practices. LBC and CNS have created a table summarizing MSU’s parental and health leave policies and a simple form through which individuals can propose such leaves; these are posted online and already in use. LBC is now drafting checklists to guide the work of search committees, the transition of new faculty and staff into the college, and the implementation of approved leaves. These should ensure greater transparency and consistency at pivotal points in people’s careers – which should further increase the diversity and quality of the college’s workforce.

Broadly speaking, LBC encourages innovation by adopting the attitude that well-motivated experiments are welcome, assessment is crucial, and failures will be analyzed for pointers toward future success. The college achieves high quality teaching and curricula by encouraging a scholarly approach to teaching and by undertaking multi-dimensional annual reviews of the educational performance of each faculty and disciplinary group. Curricular experimentation and analysis of the outcomes are rewarded – even if the project did not meet its initial aims. For instance, our ongoing development of the INQUIRE program has resulted from several rounds of experimentation, analysis, and modification. LBC’s nascent collaboration on campus-wide STEM gateway reform through the AAU STEM (and hopefully WIDER and HHMI) projects should yield larger-scale successful innovations in this vein.

**LBC’S CONTINGENCY PLANS FOR 0.5% BUDGET REDUCTION**

Most of the reduction would come from eliminating part of a fixed-term position; the resulting loss of three courses would impact 75 -150 students per term, depending on the impacted discipline. (Note that in summer 2012, LBC received enrollment funding to add seven course sections due to evidence of persistent need for additional sections of required courses.) The rest would come from eliminating part of the funding LBC received in 2013 to provide seed funds for initial research investigations linked to forthcoming external grant proposals.