

MICHIGAN STATE UNIVERSITY

August 21, 2020

MEMORANDUM

TO: Dr. Mark Largent, Associate Provost for Undergraduate Education
and Dean of Undergraduate Studies

FROM: Dr. John Gaboury, Associate Provost for Academic Services,
Enrollment Management, and Academic Initiatives

RE: Request for a New Data Science Coordinate Major in Lyman Briggs
College

For Transmittal to the University Committee on Undergraduate
Education (UCUE)

The request referenced above is being sent to the University Committee on Undergraduate Education (UCUE) in accordance with the *Bylaws for Academic Governance*, 4.4.

UCUE Response Requested:

Please ask the committee to consider the request referenced above and provide consultative commentary. Please mail the related materials referenced under the heading Attachments at the end of this memorandum to the committee members.

After receiving the committee's consultative response, the Provost will make a determination to forward or not to forward the request to the University Committee on Curriculum for its approval of curriculum and degree requirements.

If you have any questions, please call Joy Speas, University Curriculum Administrator, at 5-8420.

Thank you.

Attachments:

1. Request to Establish a New Academic Program form dated February 25, 2020: Lyman Briggs Coordinate Major in Data Science and attachments.

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University Curriculum and Catalog

Hannah Admin. Building
426 Auditorium Road
Room 439
East Lansing, MI 48824

517-355-8420
Fax: 517-355-9601

LYMAN BRIGGS COLLEGE

1. Request to recognize the **Data Science** major leading to the Bachelor of Science degree in the College of Natural Science as a **Coordinate Major in Lyman Briggs College**.

Effective Fall 2021.



Michigan State University Office of the Registrar

Program Name: LB-Data Science Degree: BS Sequence Number: 1	Program Request ID: 4108
Effective Dates: Fall 2020 - Open Status: Interim Initial Action: New	
Requested Date: 12/5/2019 4:12:20 PM	
<p>1. Department/School/College: 28546 Lyman Briggs College</p> <p>2. Name of Program: LB-Data Science</p> <p>3. Name of Degree: BS</p> <p>4. Type of Program: Major</p> <p>5. Effective Start Semester: Fall 2020</p> <p>6. Target student audience for the program: undergraduates in LBC</p> <p>7. Enrollment: What is the expected enrollment per year: 40 What is the minimum enrollment acceptable: 10</p> <p>8. Source of budget for the program: To align academic planning and curricular change, ALL requests for NEW funds must be included in the College's annual planning letter. Provost approval of new funds and the effective date for the new program must align. If funding is not approved, then the program request will not be forwarded to Faculty Senate. Internal reallocation If new funds, was this request included in the College's annual planning letter?</p>	

Indicate yes or no. If no, then this is a department or college fund reallocation (If the program is implemented, no additional resources are required.).

none

9. Projected Costs as compared to other programs in unit:

Same

10. Staff requirement:

How many additional staff will be required: 0

Who will provide the primary instruction. Describe any external linkages(industry, government, etc.):

Primary instruction of Lyman Briggs courses are from Lyman Briggs faculty. The coordinate major classes in Data Science are provided by CMSE professors and instructors.

11. Will additional equipment be required:

Approximate cost: 0

Source of funding:

12. Will additional library materials be required:

Approximate cost: 0

Source of funding: na

13. Will additional space be required:

Type: na

Approximate amount: na

14. If the program requirements contain a named concentration, do you wish for the concentration to be noted on the student's transcript?:

No

15. Detailed Description:

Lyman Briggs has internal majors, and also coordinate majors in partnership with other colleges at MSU. A coordinate major in Natural Science adopts the major requirements as is, but fulfills the university and college requirements for Lyman Briggs College. The Data Science major is a coordinate major with the College of Natural Science.

Requirements for the Bachelor of Science Degree in Lyman Briggs College

The University requirements for bachelor's degrees as described in the [Undergraduate Education](https://reg.msu.edu/AcademicPrograms/Text.aspx?Section=110) (<https://reg.msu.edu/AcademicPrograms/Text.aspx?Section=110>) section of this University catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Lyman Briggs College.

Students who are enrolled in the College of Natural Science may complete the

alternative track to Integrative Studies in Biological and Physical Sciences that is described in item 1. under the heading Graduation Requirements in the College statement. Certain courses below are equivalent to courses in the alternative track and, therefore, may be used to satisfy the alternative track.

The completion of the Lyman Briggs College mathematics and statistics requirement may also satisfy the University mathematics requirement.

The completion of Lyman Briggs 133 may be counted toward the University Tier I writing requirement.

The University's Tier II writing requirement for the Major and Coordinate Majors in Lyman Briggs College is met by completing Lyman Briggs College 492 and one of the following courses: Lyman Briggs College 321A, 321B, 322A, 322B, 323A, 323B, 324A, 324B, 325A, 325B, 326A, 326B, 327A, or 327B. Those courses are referenced below.

The requirements of Lyman Briggs College for the Bachelor of Science degree, referenced below. The credits earned in certain courses below may be counted toward College requirements as appropriate.

The following requirements of Lyman Briggs College for the Bachelor of Science degree:

CORE PROGRAM (48 to 57 credits):

Biology: One of the following groups of courses (8 to 10 credits):

- (a) Lyman Briggs 144, 145.
- (b) Biological Science 181H, 191H, 182H, 192H.
- (c) Biological Science 161, 171, 162, 172.

Chemistry: One of the following groups of courses (8 to 10 credits):

- (a) Lyman Briggs 171, 171L, 172, 172L.
- (b) Lyman Briggs 171, 171L; Chemistry 143
- (c) Lyman Briggs 171, 171L; Chemistry 251.
- (d) Chemistry 141, 142, 161.
- (e) Chemistry 141, 143, 161.
- (f) Chemistry 141, 161, 251.
- (g) Chemistry 151, 152, 161.
- (h) Chemistry 181H, 182H, 185H.

Mathematics and Statistics: One of the following groups of courses (6 to 8 credits):

- (a) Lyman Briggs 118, 119.
- (b) Lyman Briggs 118; Statistics and Probability 231.
- (c) Mathematics 132, 133.
- (d) Mathematics 132; Statistics and Probability 231.

(e) Mathematics 152H, 153H.

Physics: One of the following groups of courses (8 to 10 credits):

(a) Lyman Briggs 273, 274.

(b) Physics 231, 232, 251, 252.

(c) Physics 183, 184, 191, 192.

(d) Physics 183B, 184B, 191, 192.

(e) Physics 193H, 294H, 191, 192.

History, Philosophy and Sociology of Science: A total of 11 or 12 credits from the courses in groups below.

(a) One of the following courses: Lyman Briggs 133; Writing, Rhetoric and American Cultures 101.

(b) One of the following courses: Lyman Briggs 321A, 322A, 323A, 324A, 325A, 326A, 327A.

(c) One of the following courses: Lyman Briggs 321B, 322B, 323B, 324B, 325B, 326B, 327B.

Senior Seminar: Lyman Briggs 492 (4 credits)

Coordinate Major Requirements in Data Science

One course from each of the following groups (14-15 credits)

Calculus I: MTH 132 or MTH 152H or LB 118 (3-4 credits)

Calculus II: MTH 133 or MTH 153H or LB 119 (4 credits)

Calculus III: MTH 234 or MTH 254H or LB 220 (4 credits)

CMSE/MTH 314, Linear Algebra with Numerical Applications (3 credits)

One of the following (4 or 6 credits):

STT 380, Probability and Statistics for Data Science (4 credits)

STT 441 and 442 (6 credits)

All of the following courses (31 credits):

STT/CMSE 180, Introduction to Data Science (4 credits)

CMSE 201 and 202 (8 credits)

CSE 232 Programming, 2 (4 credits)

CSE 331, Algorithms and Data Structures (3 credits)

CMSE/STT 381, Fundamentals of Data Science Methods (4 credits)

CMSE 382, Optimization Methods in Data Science (4 credits)

CMSE/STT 495, Experiential Learning in Data Science (4 credits; requires senior standing and completion of CMSE/STT 381 and CMSE 382)

A minimum of 12 credits of approved courses at the 400-level or above. The following courses will be automatically approved, but others may be substituted by petition:

CMSE 401, Methods for Parallel Computing (4 credits)

CMSE 402, Principles of Data Visualization (3 credits)

CMSE 410, Computational Biology and Bioinformatics (3 credits)

CMSE 411, Computational Medicine (3 credits)

CMSE/CSE/STT 492, Special topics in Data Science (1-4 credits; up to twelve credits may count toward the degree with advisor approval)

CSE 402, Biometrics and Pattern Recognition (3 credits)

CSE 440, Introduction to Artificial Intelligence (3 credits)

CSE 480, Database Systems (3 credits)

CSE 482, Big Data Analysis (3 credits)

MTH 468, Predictive Analytics (3 credits)

STT 464, Statistics for Biologists (3 credits)

STT 465, Bayesian Statistical Methods (3 credits)

16. Are there admissions requirements for this program?:

Grade or grade-point average requirements and if so in which course(s), portfolio requirement, audition, essay, etc. If there are not admission requirements other than those required by the University policy indicate "none".

.none

DEPARTMENT LEVEL APPROVAL STATUS

Approved: Lyman Briggs College
2/25/2020 11:49:47 AM by Karen Mills for Michele Horner Jackson, Dean

SIGNOFFS STATUS

Signed Off: Department of Computational Mathematics, Science, and Engineering
2/25/2020 2:06:18 PM by Brittany Toman for Andrew J. Christlieb, Chairperson

COLLEGE LEVEL APPROVAL STATUS

Approved: Lyman Briggs College
2/25/2020 2:14:36 PM by Karen Mills for Michele Horner Jackson, Dean

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DATA SCIENCE

The Bachelor of Science degree in Data Science is designed to provide students with a strong background in data science using a broad range of computational techniques, practice in statistical thinking, as well as in-depth exposure to topics in data science.

Requirements for the Bachelor of Science Degree in Data Science

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Data Science.

The University's Tier II writing requirement for the Data Science major is met by completing Computational Mathematics, Science and Engineering 495, referenced in item 3. below.

2. The requirements of the College of Natural Science for the Bachelor of Science degree.

3. The following requirements for the major:

CREDITS

a. One course from each of the following groups (8 or 10 credits):

- (1) CEM 141 General Chemistry 4
- CEM 151 General and Descriptive Chemistry 4
- CEM 181H Honors Chemistry I 4
- LB 171 Principles of Chemistry I 4
- (2) CEM 142 General and Inorganic Chemistry 3
- CEM 152 Principles of Chemistry 3
- CEM 182H Honors Chemistry II 4
- LB 172 Principles of Chemistry II 3
- (3) CEM 161 Chemistry Laboratory I 1
- CEM 185H Honors Chemistry Laboratory I 2
- LB 171L Introductory Chemistry Laboratory I 1

b. One course from each of the following groups (8 credits):

- (1) LB 273 Physics I 4
- PHY 183 Physics for Scientists and Engineers I 4
- (2) LB 274 Physics II 4
- PHY 184 Physics for Scientists and Engineers II 4

c. One course from each of the following groups (14 or 15 credits):

- (1) LB 118 Calculus I 4
- MTH 132 Calculus I 3
- MTH 152H Honors Calculus I 3
- (2) LB 119 Calculus II 4
- MTH 133 Calculus II 4
- MTH 153H Honors Calculus II 4
- (3) LB 220 Calculus III 4
- MTH 234 Multivariable Calculus 4
- MTH 254H Honors Multivariable Calculus 4
- (4) MTH 314 Matrix Algebra with Computational Applications 3

d. One of the following groups (4 or 6 credits):

- (1) STT 380 Probability and Statistics for Data Science 4
- (2) STT 441 Probability and Statistics I: Probability 3
- STT 442 Probability and Statistics I: Statistics 3

e. All of the following courses (31 credits):

- CMSE 201 Introduction to Computational Modeling and Data Analysis 4
- CMSE 202 Computational Modeling Tools and Techniques 4
- CMSE 381 Fundamentals of Data Science Methods 4
- CMSE 382 Optimization Methods in Data Science 4
- CMSE 495 Experiential Learning in Data Science 4
- CSE 232 Introduction to Programming II 4
- CSE 331 Algorithms and Data Structures 3
- STT 180 Introduction to Data Science 4

f. A minimum of 12 credits of approved 400-level courses or above. The following courses are eligible to fulfill this requirement. Other may be substituted with advisor approval.

- CMSE 401 Methods for Parallel Computing 4
- CMSE 402 Data Visualization Principles and Techniques 3
- CMSE 410 Computational Biology and Bioinformatics 3
- CMSE 411 Computational Medicine 3
- CMSE 492 Special Topics in Data Science 1 to 4
- CSE 402 Biometrics and Pattern Recognition 3
- CSE 440 Introduction to Artificial Intelligence 3
- CSE 480 Database Systems 3
- CSE 482 Big Data Analysis 3
- MTH 468 Predictive Analytics 3
- STT 464 Statistics for Biologists 3
- STT 465 Bayesian Statistical Methods 3

A maximum of 12 credits may count towards the degree for enrollments in CMSE 492 with advisor approval.

Requirements for the Bachelor of Science Degree in Lyman Briggs College

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this University catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Lyman Briggs College.

Students who are enrolled in Lyman Briggs College may complete the alternative track to Integrative Studies in Biological and Physical Sciences that is described in item 1. under the heading *Graduation Requirements* in the College statement. Certain courses referenced in requirement 3. below are equivalent to courses in the alternative track and, therefore, may be used to satisfy the alternative track.

The completion of the Lyman Briggs College mathematics and statistics requirement [referenced in item 3.c.(4) below] may also satisfy the University mathematics requirement.

The completion of Lyman Briggs 133 or one of the approved alternatives [referenced in requirement 3.a.(5)(a) below] may also be counted toward the University Tier I writing requirement.

The University's Tier II writing requirement for the Major and Coordinate Majors in Lyman Briggs College is met by completing Lyman Briggs College 492 and one of the following courses: Lyman Briggs College 321A, 321B, 322A, 322B, 323A, 323B, 324A, 324B, 325A, 325B, 326A, 326B, 327A, or 327B. Those courses are referenced in items 3. a. (5) and 3. a. (6) below.

2. The requirements of Lyman Briggs College for the Bachelor of Science degree, referenced in item 3. a. below.

The credits earned in certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate.

3. The following requirements of Lyman Briggs College for the Bachelor of Science degree:

	CREDITS
a. CORE PROGRAM	48 to 57

- (1) **Biology:** One of the following **groups** of courses (8 to 10 credits):
 - (a) Lyman Briggs 144, 145.
 - (b) Biological Science 181H, 191H, 182H, 192H.
 - (c) Biological Science 161, 171, 162, 172.
- (2) **Chemistry:** One of the following **groups** of courses (8 to 10 credits):
 - (a) Lyman Briggs 171, 171L, 172, 172L.
 - (b) Lyman Briggs 171, 171L; Chemistry 143
 - (c) Lyman Briggs 171, 171L; Chemistry 251.
 - (d) Chemistry 141, 142, 161.
 - (e) Chemistry 141, 143, 161.
 - (f) Chemistry 141, 161, 251.
 - (g) Chemistry 151, 152, 161.
 - (h) Chemistry 181H, 182H, 185H.
- (3) **Mathematics and Statistics:** One of the following **groups** of courses (6 to 8 credits):
 - (a) Lyman Briggs 118, 119.
 - (b) Lyman Briggs 118; Statistics and Probability 231.
 - (c) Mathematics 132, 133.
 - (d) Mathematics 132; Statistics and Probability 231.
 - (e) Mathematics 152H, 153H.
- (4) **Physics:** One of the following **groups** of courses (8 to 10 credits):
 - (a) Lyman Briggs 273, 274.
 - (b) Physics 231, 232, 251, 252.
 - (c) Physics 183, 184, 191, 192.
 - (d) Physics 183B, 184B, 191, 192.
 - (e) Physics 191, 192, 193H, 294H.
- (5) **History, Philosophy and Sociology of Science:** A total of 11 or 12 credits from the courses in groups (a), (b), and (c) below.
 - (a) One of the following courses: Lyman Briggs 133; Writing, Rhetoric and American Cultures 101.
 - (b) One of the following courses: Lyman Briggs 321A, 322A, 323A, 324A, 325A, 326A, 327A.
 - (c) One of the following courses: Lyman Briggs 321B, 322B, 323B, 324B, 325B, 326B, 327B.
- (6) **Senior Seminar:** Lyman Briggs 492 (4 credits).

b. MAJOR or COORDINATE MAJOR.
 Each student must complete the requirements of a Major or a Coordinate Major. The Major or Coordinate Major must be chosen from the lists of options below. **Both** the Major or Coordinate Major *and* the related courses must be approved by the student's academic advisor. With the approval of the appropriate Lyman Briggs College Curriculum Coordinator or Undergraduate Director, courses other than those that are listed as requirements for a Major or Coordinate Major may be used to satisfy degree requirements.

- Majors:**
 Biology
 Computer Science
 Earth Science
 Environmental Science and Management
 Physical Science
 History, Philosophy and Sociology of Science

- Coordinate Majors:**
 (1) College of Agriculture and Natural Resources:

- Animal Science
- Entomology
- Fisheries and Wildlife
- Food Science
- (2) College of Engineering:
 - Computer Science
 - Students are admitted to this Coordinate Major after they have reached junior standing and have met certain other requirements specified by Lyman Briggs College .
- (3) College of Natural Science:
 - Actuarial Science
 - Astrophysics
 - Biochemistry and Molecular Biology
 - Biochemistry/Biotechnology
 - Biological Science—Interdepartmental
 - Biomedical Laboratory Science
 - Chemical Physics
 - Chemistry
 - Computational Chemistry
 - ~~Computational Mathematics~~
 - Earth Science—Interdepartmental
 - Environmental Biology/Microbiology
 - Environmental Biology/Plant Biology
 - Environmental Biology/Zoology
 - Environmental Geosciences
 - Genomics and Molecular Genetics
 - Geological Sciences
 - Human Biology
 - Mathematics
 - Mathematics, Advanced
 - Microbiology
 - Neuroscience
 - Nutritional Sciences
 - Physical Science—Interdepartmental
 - Physics
 - Physiology
 - Plant Biology
 - Statistics
 - Zoology

Data Science