PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to change the requirements for the Agricultural Technology Certificate in Agricultural Industries in The Institute of Agricultural Technology.
   a. Under the heading Requirements for Agricultural Industries make the following changes:
      (1) In item 1. delete the following courses:
          ABM 100 Decision-making in the Agri-Food System 3
          ABM 130 Farm Management I 3
          CSS 105 Agricultural Industries Seminar 1
          Add the following courses:
          AFRE 100 Decision-making in the Agri-Food System 3
          AFRE 130 Farm Management I 3
          CSS 192 Professional Development Seminar I 1
      (2) In item 3. delete the following courses:
          ABM 222 Agribusiness and Food Industry Sales 3
          ABM 225 Commodity Marketing I 3
          Add the following courses:
          AFRE 222 Agribusiness and Food Industry Sales 3
          AFRE 232 Commodity Marketing I 3
   Effective Fall 2021.

2. Request to change the requirements for the Agricultural Technology Certificate in Electrical Technology in the Institute of Agricultural Technology.
   a. Under the heading Electrical Technology replace the entire entry with the following:

Requirements for Electrical Technology

CREDITS

1. All of the following courses (38 to 41 credits):
   AE 102 Electrical Lighting for Residential and Agricultural Facilities 2
   AE 172 Electrical Wiring I 4
   AE 173 Electrical Occupations 1
   AE 182 Electrical Wiring II 3
   AE 185 Electrical Applications 3
   AE 192 Electrical Wiring III 4
   AE 194 Electrical Systems Planning 4
   AT 045 Agricultural Communications 2
   AT 071 Technical Mathematics 2
   AT 293 Professional Internship in Agricultural Technology 3
   TSM 121 Fundamentals of Electricity 4
   TSM 130 Energy Efficiency and Conservation in Agricultural Systems 3
   TSM 222 Fundamentals of Automation and Controls 3
   Students who demonstrate proficiency through placement testing for AT 045 and AT 071 will take elective course work to substitute the credit in those courses.
2. The following course or equivalent certification:
   KIN 125 First Aid and Personal Safety 3
   Equivalent certification is current first aid and CPR certification.
3. Complete 8 to 14 credits of additional Agricultural Technology courses chosen in consultation with and approved by the program coordinator.

Effective Summer 2022.

COLLEGE OF HUMAN MEDICINE

1. Request to change the requirements for the Master of Science degree in Biostatistics in the Department of Epidemiology and Biostatistics. The University Committee on Graduate Studies (UCGS) will review this request at its April 12, 2021 meeting.
   a. Under the heading Requirements for the Master of Science degree in Biostatistics replace the entire entry with the following:

   The program is available under either Plan A (with thesis) or Plan B (without thesis). A total of 33 credits is required for both Plan A or Plan B, with no more than 6 credits at the 400-level. The student’s program of study must be approved by the student’s academic advisor and guidance committee with the approval of the Dean of the College of Human Medicine.

   In addition to meeting the requirements of the university and of the College of Human Medicine, the student must meet the following:

<table>
<thead>
<tr>
<th>CREDITS</th>
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</thead>
<tbody>
<tr>
<td>1. All of the following courses (11 credits):</td>
</tr>
<tr>
<td>EPI 808B Advanced Biostatistics 3</td>
</tr>
<tr>
<td>EPI 810 Introductory Epidemiology 3</td>
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<tr>
<td>EPI 826B Categorical Data Analysis 3</td>
</tr>
<tr>
<td>EPI 828 Seminar in Responsible Conduct of Research 1</td>
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<tr>
<td>EPI 856 Statistical Consulting in Public Health 1</td>
</tr>
<tr>
<td>2. Complete one of the following courses (3 credits):</td>
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<tr>
<td>EPI 853B Statistical Computing 3</td>
</tr>
<tr>
<td>STT 802 Statistical Computation 3</td>
</tr>
<tr>
<td>3. Complete 12 to 15 additional credits in biostatistics electives from the following:</td>
</tr>
<tr>
<td>EC 821A Cross Section and Panel Data Econometrics I 3</td>
</tr>
<tr>
<td>EC 821B Cross Section and Panel Data Econometrics II 3</td>
</tr>
<tr>
<td>EPI 851 SAS Programming I: Essentials 1</td>
</tr>
<tr>
<td>EPI 852 SAS Programming II: Data Management and Analysis 1</td>
</tr>
<tr>
<td>EPI 855 Biostatistical Modeling in Genomic Data Analysis 3</td>
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<tr>
<td>EPI 858 Clinical Trials 3</td>
</tr>
<tr>
<td>EPI 951 Latent Variable Modeling 3</td>
</tr>
<tr>
<td>EPI 952 Duration and Severity Analysis 3</td>
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<tr>
<td>EPI 953 Analytical Strategies for Observational Studies 3</td>
</tr>
<tr>
<td>FOR 875 R Programming for Data Sciences 3</td>
</tr>
<tr>
<td>STT 464 Statistics for Biologists 3</td>
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<tr>
<td>STT 465 Bayesian Statistical Methods 3</td>
</tr>
<tr>
<td>STT 801 Design of Experiments 3</td>
</tr>
<tr>
<td>STT 814 Advanced Statistics for Biologists 4</td>
</tr>
<tr>
<td>STT 825 Sample Surveys 3</td>
</tr>
<tr>
<td>STT 847 Analysis of Survival Data 3</td>
</tr>
<tr>
<td>STT 861 Theory of Probability and Statistics I 3</td>
</tr>
<tr>
<td>STT 862 Theory of Probability and Statistics II 3</td>
</tr>
<tr>
<td>Additional elective courses may be chosen with advisor approval.</td>
</tr>
<tr>
<td>4. Complete 3 additional credits of epidemiology electives from the following:</td>
</tr>
<tr>
<td>EPI 805 Readings in the Historical Roots of Epidemiological Thought 3</td>
</tr>
<tr>
<td>EPI 812 Causal Inference in Epidemiology 3</td>
</tr>
<tr>
<td>EPI 815 Epidemiology of Cardiovascular Disease 3</td>
</tr>
<tr>
<td>EPI 816 Perinatal Epidemiology 3</td>
</tr>
</tbody>
</table>
5. Attend all MSU Graduate School Responsible Conduct of Research (RCR) Workshops (Human).

Additional Requirements for Plan A
1. The following course (4 credits):
   EPI 899 Master's Thesis Research

Additional Requirements for Plan B
1. Complete a capstone project through enrollment in 1 credit of EPI 890 Independent Study in Epidemiology and Biostatistics.
2. Pass a final oral examination or evaluation of the capstone project.

Effective Fall 2021.

2. Request to change the requirements for the Doctor of Philosophy degree in Biostatistics in the Department of Epidemiology and Biostatistics. The University Committee on Graduate Studies (UCGS) will consider this request at its April 12, 2021 meeting.

   a. Under the heading Admission, in the second paragraph, change 'the first 30 credits' to 'the first 40 credits'.

   b. Under the heading Requirements for the Doctor of Philosophy Degree in Biostatistics replace the entire entry with the following:

   The doctoral degree program offers three concentration areas: design and analysis of medical studies; big data and statistical genetics; and ad biometry, a flexible option for students with diverse interests. The concentration is selected in consultation with a faculty advisor and guidance committee.

   Students must:

   1. Complete all of the following courses (13 credits):
      EPI 810 Introductory Epidemiology
      EPI 828 Seminar in Responsible Conduct of Research
      EPI 860 Advanced Inference for Biostatistics
      STT 867 Linear Model Methodology
      STT 868 Mixed Models: Theory, Methods and Applications
   2. Complete one of the following concentrations:
      Design and Analysis of Medical Studies
      1. One of the following courses (3 credits):
         EPI 858 Clinical Trial I
         EPI 952 Duration and Severity Analysis
         STT 847 Analysis of Survival Data
      Or
      2. Complete 11 credits of elective course work:
         ANS 814 Advanced Statistics for Biologists
         CSE 331 Algorithms and Data Structures
         CSE 480 Database Systems
         CSE 482 Big Data Analysis
         CSE 847 Machine Learning
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 881</td>
<td>Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>EC 821A</td>
<td>Cross Section and Panel Data</td>
<td>3</td>
</tr>
<tr>
<td>Ec 821</td>
<td>Cross Section and Panel Data</td>
<td>3</td>
</tr>
<tr>
<td>EPI 812</td>
<td>Causal Inference in Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>EPI 855</td>
<td>Biostatistical Modeling in Genomic Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EPI 880</td>
<td>Selected Topics in Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>EPI 920</td>
<td>Advanced Methods in Epidemiology and Applied Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EPI 950</td>
<td>Advanced Biostatistical Methods in Epidemiology</td>
<td>3</td>
</tr>
<tr>
<td>EPI 952</td>
<td>Duration and Severity Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EPI 953</td>
<td>Analytical Strategies for Observational Studies</td>
<td>3</td>
</tr>
<tr>
<td>EPI 990</td>
<td>Independent Study</td>
<td>3</td>
</tr>
<tr>
<td>STT 801</td>
<td>Design of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>STT 825</td>
<td>Sample Surveys</td>
<td>3</td>
</tr>
<tr>
<td>STT 855</td>
<td>Statistical Genetics</td>
<td>3</td>
</tr>
<tr>
<td>STT 861</td>
<td>Theory of Probability and Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STT 862</td>
<td>Theory of Probability and Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>STT 873</td>
<td>Statistical Learning and Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>STT 874</td>
<td>Introduction to Bayesian Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Big Data and Statistical Genetics**

1. One of the following courses:
   - EPI 855 Biostatistical Modeling in Genomic Data Analysis 3
   - Or
   - STT 855 Statistical Genetics 3
   - CSE 231 Introduction to Programming I 3
   - Or
   - CSE 232 Introduction to Programming II 4
   - STT 456 Actuarial Models II 3

2. Complete 11 credits of elective course work:
   - ANS 814 Advanced Statistics for Biologists 4
   - CSE 331 Algorithms and Data Structures 3
   - CSE 480 Database Systems 3
   - CSE 482 Big Data Analysis 3
   - CSE 847 Machine Learning 3
   - CSE 881 Data Mining 3
   - EC 821A Cross Section and Panel Data Econometrics I 3
   - EC 821 Cross Section and Panel Data Econometrics II 3
   - EPI 812 Causal Inference in Epidemiology 3
   - EPI 858 Clinical Trials 3
   - EPI 880 Selected Topics in Biostatistics 3
   - EPI 920 Advanced Methods in Epidemiology and Applied Statistics 3
   - EPI 950 Advanced Biostatistical Methods in Epidemiology 3
   - EPI 952 Duration and Severity Analysis 3
   - EPI 953 Analytical Strategies for Observational Studies 3
   - EPI 990 Independent Study 3
   - STT 801 Design of Experiments 3
   - STT 825 Sample Surveys 3
   - STT 861 Theory of Probability and Statistics I 3
   - STT 862 Theory of Probability and Statistics II 3
   - STT 873 Statistical Learning and Data Mining 3
   - STT 874 Introduction to Bayesian Analysis 3

Additional courses may be chosen with advisor approval.
Biometry

1. Complete 14 credits of elective course work:
   - ANS 814 Advanced Statistics for Biologists 4
   - CSE 331 Algorithms and Data Structures 3
   - CSE 480 Database Systems 3
   - CSE 482 Big Data Analysis 3
   - CSE 847 Machine Learning 3
   - CSE 881 Data Mining 3
   - EC 821A Cross Section and Panel Data Econometrics I 3
   - EC 821 Cross Section and Panel Data Econometrics II 3
   - EPI 812 Causal Inference in Epidemiology 3
   - EPI 855 Biostatistical Modeling in Genomic Data Analysis 3
   - EPI 858 Clinical Trials 3
   - EPI 880 Selected Topics in Biostatistics 3
   - EPI 920 Advanced Methods in Epidemiology and Applied Statistics 3
   - EPI 950 Advanced Biostatistical Methods in Epidemiology 3
   - EPI 952 Duration and Severity Analysis 3
   - EPI 953 Analytical Strategies for Observational Studies 3
   - EPI 990 Independent Study 3
   - STT 801 Design of Experiments 3
   - STT 825 Sample Surveys 3
   - STT 847 Survival Analysis 3
   - STT 855 Statistical Genetics 3
   - STT 861 Theory of Probability and Statistics I 3
   - STT 862 Theory of Probability and Statistics II 3
   - STT 873 Statistical Learning and Data Mining 3
   - STT 874 Introduction to Bayesian Analysis 3

   Additional courses may be chosen with advisor approval.

2. Attend all MSU Graduate School Responsible Conduct of Research (RCR) Workshops (human).
3. Attend 80% of department-sponsored Seminars.
4. Attend 80% of department Ph.D. Journal Club meetings.
5. Present at one Ph.D. Journal Club meeting.
6. Pass a comprehensive examination.

Academic Standards

Students will sit for a comprehensive examination after the necessary course work is completed, typically at the end of the first year of study. A student who fails the comprehensive examination may repeat it only once. A retake examination will generally be given in January.

Effective Fall 2021.
3. Request to change the requirements for the **Master of Science** degree in **Epidemiology** in the Department of Epidemiology and Biostatistics. The University Committee on Graduate Studies (UCGS) will review this request at its April 12, 2021 meeting.

b. Under the heading **Requirements for the Master of Science** degree in **Epidemiology** make the following changes:

1. Change the entry paragraph to the following:

   Students must complete 40 credits, with no more than 6 credits at the 400-level.

2. Replace items 3. and 4. with the following:

   3. An additional 6 credits of elective course work from the following list of approved courses:
      - EPI 805  Readings in the Historical Roots of Epidemiological Thought 3
      - EPI 815  Epidemiology of Cardiovascular Disease 3
      - EPI 816  Perinatal Epidemiology 3
      - EPI 823  Cancer Epidemiology 3
      - EPI 835  Neuroepidemiology 3
      - EPI 890  Independent Study in Epidemiology and Biostatistics 1 to 3
      - EPI 910  Themes in Contemporary Epidemiology 3
      - EPI 920  Advanced Methods in Epidemiology and Applied Statistics 3
      - EPI 950  Advanced Biostatistical Methods in Epidemiology 3
      - EPI 952  Duration and Severity Analysis 3
      - EPI 953  Analytical Strategies for Observational Studies 3
      - EPI 977  Social Epidemiology 3
      - EPI 979  Advanced Topics of Infectious Disease Epidemiology 3
      - STT 847  Analysis of Survival Data 3
      - Additional elective courses may be chosen with advisor approval.

   4. Attend all MSU Graduate School Responsible Conduct of Research (RCR) Workshops (Human).

   5. Pass an oral examination in defense of the thesis.

Effective Fall 2021.

4. Request to change the requirements for the **Doctor of Philosophy** degree in **Epidemiology** in the Department of Epidemiology and Biostatistics. The University Committee on Graduate Studies (UCGS) will consider this request at its April 12, 2021 meeting.

a. Under the heading **Admission** replace item 1. with the following:

   1. an applicant must have earned a bachelor’s, master of science or a master of public health in epidemiology degree with at least 40 credits.

b. Under the heading **Requirements for the Doctor of Philosophy** degree in **Epidemiology** replace the entire entry with the following:

   Students must complete 51 credits for the degree with no more than 6 credits at the 400-level.

   1. All of the following courses (7 credits):
      - EPI 805  Readings in the Historical Roots of Epidemiological Thought 3
      - EPI 828  Seminar in Responsible Conduct of Research 1
      - EPI 910  Themes in Contemporary Epidemiology 3

   2. Two of the following courses (6 credits):
      - EPI 855  Biostatistical Modeling in Genomic Data Analysis 3
      - EPI 920  Advanced Methods in Epidemiology and Applied Statistics 3
      - EPI 950  Advanced Biostatistical Methods in Epidemiology 3
      - EPI 952  Duration and Severity Analysis 3
      - EPI 953  Analytical Strategies for Observational Studies 3
3. Complete a minimum of 15 credits of elective course work from the following list of approved courses. Additional courses may be chosen with advisor approval.

- EPI 815 Epidemiology of Cardiovascular Disease 3
- EPI 816 Perinatal Epidemiology 3
- EPI 823 Cancer Epidemiology 3
- EPI 835 Neuroepidemiology 3
- EPI 890 Independent Study in Epidemiology and Biostatistics 1 to 3
- EPI 910 Themes in Contemporary Epidemiology 3
- EPI 920 Advanced Methods in Epidemiology and Applied Statistics 3
- EPI 950 Advanced Biostatistical Methods in Epidemiology 3
- EPI 952 Duration and Severity Analysis 3
- EPI 953 Analytical Strategies for Observational Studies 3
- EPI 977 Social Epidemiology 3
- EPI 979 Advanced Topics of Infectious Disease Epidemiology 3
- STT 847 Analysis of Survival Data 3

4. Attend all MSU Graduate School Responsible Conduct of Research (RCR) Workshops.
5. Attendance at 80% of all presentations in the departmental epidemiology seminar series during the period of course work.
6. Attendance at 80% of Ph.D. Journal Club meetings.
7. Present at one Ph.D. Journal Club meeting.
8. Pass a Qualifying Examination at the end of the first year of study.
10. Successfully complete 24 credits of Epidemiology 999 Doctoral Dissertation Research.
11. Successfully defend the oral defense of the doctoral dissertation.

Effective Fall 2021.

LYMAN BRIGGS COLLEGE

1. Request to recognize the Forestry major leading to the Bachelor of Science degree in the College of Agriculture and Natural Resources as a Coordinate Major in Lyman Briggs College.

Effective Fall 2021.

COLLEGE OF NATURAL SCIENCE

1. Request to change the requirements for the Disciplinary Teaching Minor available for secondary certification in Biology in the College of Natural Science. The Teacher Education Council (TEC) will consider this request at its April 12, 2021 meeting.

a. Under the heading Biology make the following changes:

(1) Under the second requirement 'All of the following courses', change the total credits from '14 to 16' to '16 to 18' and add the following courses:

- TE 409 Crafting Teaching Practices in the Secondary Teaching Minor 1
- TE 503 Internship in Teaching Diverse Learners in Additional Endorsement Areas 1

(2) Change the total credits from '23 to 26' to '25 to 28'.

Effective Fall 2021.
2. Request to change the requirements for the **Disciplinary Teaching Minor in Chemistry** in the Department of Chemistry. The Teacher Education Council (TEC) will consider this request at its April 12, 2021 meeting.

   a. **Under the heading Chemistry** make the following changes:

      (1) **Delete the following:**

      The following course:
      
      CEM 383 Introductory Physical Chemistry I 3

      **Add the following:**

      One of the following courses:
      
      CEM 444 Chemical Safety 1
      ISE 401 Science Laboratories for Secondary Schools (W) 4
      The following courses:
      
      CEM 383 Introductory Physical Chemistry I 3
      TE 409 Crafting Teaching Practice in the Secondary Teaching Minor 1
      TE 503 Internship in Teaching Diverse Learners in Additional Endorsement Areas 1

      (2) **Change the total credits from ‘23’ to ‘26 to 29’.

      Effective Fall 2021.

3. Request to change the requirements for the **Disciplinary Teaching Minor in Earth Science** in the Department of Earth and Environmental Sciences. The Teacher Education Council (TEC) will consider this request at its April 12, 2021 meeting.

   a. **Under the heading Earth Science** make the following changes:

      (1) **Delete the following course:**

      GLG 303 Oceanography 4

      **Add the following courses:**

      GLG 303 Oceanography 3
      TE 409 Crafting Teaching Practice in the Secondary Teaching Minor 1
      TE 503 Internship in Teaching Diverse Learners in Additional Endorsement Areas 1

      (2) **Change the total credits from ‘22’ to ‘23’.

      Effective Fall 2021.
3. Request to change the requirements for the **Disciplinary Teaching Minor** in **Mathematics-Secondary** in the Department of Mathematics. The Teacher Education Council (TEC) will consider this request at its April 12, 2021 meeting.

a. Under the heading **Mathematics-Secondary** make the following changes:

   (1) In item 2. delete the following course:

   MTH 317H Honors Linear Algebra 3

   Add the following course:

   MTH 317H Honors Linear Algebra 4

   (2) Add the following item 5.:

   5. Both of the following courses (2 credits):

      TE 409 Crafting Teaching Practice in the Secondary Teaching Minor 1

      TE 503 Internship in Teaching Diverse Learners in Additional Endorsement Areas 1

   (3) Change the total credits from ’20 to 24’ to ’23 to 27’.

Effective Fall 2021.

4. Request to change the requirements for the **Disciplinary Teaching Minor** in **Physics** in the Department of Physics and Astronomy. The Teacher Education Council (TEC) will consider this request at its April 12, 2021 meeting.

a. Under the heading **Physics** make the following changes:

   (1) Add the following courses:

      TE 409 Crafting Teaching Practice in the Secondary Teaching Minor 1

      TE 503 Internship in Teaching Diverse Learners in Additional Endorsement Areas 1

   (2) Change the total credits from ’20 to 22’.

Effective Fall 2021.
PART II - NEW COURSES AND CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

AE 182  Electrical Wiring II
Spring of every year. 2(1-3) 3(2-3) RB: AE 172 R: Open to students in the Institute of Agricultural Technology.
Installation of electrical circuits for residential, light commercial and agricultural installations. Offered first ten weeks of semester.
SA: AE 082
Effective Summer 2015 Effective Summer 2022

FSC 423  Functional Foods and Human Health
Spring of even years. 3(3-0) P: {HNF 150 or (HNF 311 or concurrently)) and (MMG 205 or MMG 301 or FSC 342) and ((BMB 200 or concurrently) or (BMB 401 or concurrently))
Positive and negative impacts on health, and regulatory aspects.
Effective Fall 2021

FSC 854  Global Regulation of Food Contact Substances and Packaging
Spring of odd years. 3(3-0) RB: Prior coursework or equivalent professional experience in food safety, food law, or food science
NEW Regulation of food contact substances (FCSs) and materials (FCMs); FCS/FCM scientific and health issues related to regulation; Codex Alimentarius; regulations in the U.S. and around the globe; future regulatory developments in plastics and packaging.
Effective Fall 2021

HNF 844  Management and Professional Skills in Dietetics
Fall of every year. 3(3-0) RB: Completion of a practicum in dietetics after undergraduate dietetic and nutrition courses. R: Open to master's students in the Nutrition and Dietetics Major or approval of department.
NEW Dietetic career skills including collaboration, communication, human resources, budgeting, goal setting, and team productivity.
Effective Fall 2021

COLLEGE OF HUMAN MEDICINE

HM 639  Northern Wilderness, Emergency and Sports Medicine
Fall of every year. Spring of every year. Summer of every year. 6 credits. R: Open to students in the College of Human Medicine. Approval of college.
Development of knowledge, skills and attitudes to address the needs of patients outside of the hospital with wilderness or sports related injuries.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer 2013 Effective Summer 2021
PART II - NEW COURSES AND CHANGES – continued - 11
April 20, 2021

COLLEGE OF NATURAL SCIENCE

BMB 461  Advanced Biochemistry I
Fall of every year. Spring of every year. 3(3-0) P: (CEM 251 or CEM 351) and (CEM 252 or CEM 352) and (MTH 124 or MTH 132 or MTH 152H or LB 118) and (BS 161 or BS 181H or LB 145) and (BS 162 or concurrently) or (BS 182H or concurrently) or (LB 144 or concurrently) P: (CEM 251 or CEM 351 or LB 271) and (CEM 252 or CEM 352) and (MTH 124 or MTH 132 or MTH 152H or LB 118) and (BS 161 or BS 181H or LB 145) and (BS 162 or concurrently) or (BS 182H or concurrently) or (LB 144 or concurrently)) Not open to students with credit in BMB 401.
Structure, function, and biophysical properties of biomolecules in a wide variety of organisms. Emphasis on proteins and carbohydrates including enzyme catalysis and kinetics, the central metabolic pathways, and photosynthesis.
SA: BCH 461

BMB 864  Plant Specialized Metabolism
Spring of every year. 3(3-0) Interdepartmental with Plant Biology. P: BMB 461 or BMB 462 or (PLB 866 or concurrently) RB: Enrolled in a graduate program related to plant molecular sciences. RB: Interest in applied biotech, basic knowledge in molecular bio, genomics, or biochemistry.
BMB 801 (Mol Gen) or BMB 865 (Plant Mol Bio) or BMB 961 (Genomics) (or equivalent graduate level classes) and enrolled in a graduate program related to plant molecular sciences.
Specialized metabolism unique to photosynthetic organisms including aspects of nitrogen and sulfate assimilation and essential amino acid synthesis relevant to specialized metabolism, vitamin synthesis, mono-, di-, tri- and tetra-terpenoid synthesis, synthesis of phenylpropanoids and other aromatic compounds and synthesis of various alkaloids.
Interdisciplinary course for graduate students with interest in biotechnological applications of plant biochemistry. Cases of plant specialized metabolism, including biosynthesis of terpenes, phenylpropanoids and alkaloids will be used to develop concepts and ideas that may have the potential for commercialized.
SA: BCH 864

BS 172  Organismal and Population Biology Laboratory
Fall of every year. Spring of every year. Summer of every year. 2(1-3) Interdepartmental with Integrative Biology and Plant Biology. Interdepartmental with Plant Biology P: (BS 162 or concurrently) or (BS 182H or concurrently) Not open to students with credit in BS 192H or LB 144.
Nature and process of organismal biology including experimental design, statistical methods, hypothesis testing in genetics, ecology, and evolution.
SA: BS 110, BS 158H

BS 182H  Honors Organismal and Population Biology
Fall of every year. 3(3-0) Interdepartmental with Integrative Biology and Lyman Briggs and Plant Biology. Interdepartmental with Plant Biology Not open to students with credit in LB 144.
Diversity and basic properties of organisms, with emphasis on genetic principles, ecological interactions, and the evolutionary process. Historical approach to knowledge discovery.
SA: BS 148H, BS 110

BS 192H  Honors Organismal and Population Biology Laboratory
Fall of every year. 2(1-3) Interdepartmental with Integrative Biology and Lyman Briggs and Plant Biology. Interdepartmental with Plant Biology P: BS 182H or concurrently Not open to students with credit in LB 144.
Nature and process of organismal biology, including experimental design and statistical methods, hypothesis testing, genetics, ecology, and evolution.
SA: BS 158H, BS 110
GLG 871  Introduction to Seismology  
Fall of odd years. 3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. RB: Introductory mathematics, including calculus and multivariable calculus; Introductory physics, including classical mechanics and optics; Introductory geology.  
NEW Stress and strain, elastic wave propagation in layered media, earthquake mechanism, and semi-quantitative understanding of common seismic methods for studying the Earth’s interior. Effective Fall 2021

GLG 875  Modern Geodesy and Applications  
Fall of even years. 3(3-0) RB: Introductory mathematics, including calculus and multivariable calculus; experience with linear algebra recommended; Introductory physics, including classical mechanics and optics; Introductory geology.  
NEW Modern geodetic methods including the Global Positioning System, measuring steady or time-variable motions, the physical models that are used to interpret these observations, and applications to active geological processes, the cryosphere, and hydrology. Effective Fall 2022

NSC 844  Tools for Women in STEM  
Spring of every year. 2(2-0) R: Open to graduate students in the College of Engineering. Approval of department.  
NEW Directed at graduate students considering a career in STEM. This course provides strategies to help students advance their goals and mitigate the challenges they may encounter. Effective Spring 2021