

## Applied Engineering Sciences

### 1. University Requirements: (23-24)

|                                               |     |
|-----------------------------------------------|-----|
| Writing, Rhetoric and American Cultures (WRA) | 4   |
| Integrative Studies in Humanities (IAH)       | 8   |
| IAH 201-210 and IAH 211 or >                  |     |
| Integrative Studies in Social Sciences (ISS)  | 8   |
| ISS 2XX and ISS 3XX                           |     |
| Bioscience (one of the following):            |     |
| BS 161, ENT 205, IBIO 150, MMG 141            |     |
| MMG 201, PLB 105, PSL 250                     | 3-4 |

### 2. College Requirements: (30)

|           |                                       |   |
|-----------|---------------------------------------|---|
| *CEM 141  | General Chemistry                     | 4 |
| *EGR 100  | Introduction to Engineering Design    | 2 |
| **EGR 102 | Introduction to Engineering Modeling  | 2 |
| *MTH 132  | Calculus I                            | 3 |
| *MTH 133  | Calculus II                           | 4 |
| MTH 234   | Multivariable Calculus                | 4 |
| MTH 235   | Differential Equations                | 3 |
| *PHY 183  | Physics for Scientists & Engineers I  | 4 |
| PHY 184   | Physics for Scientists & Engineers II | 4 |

\*College Admission Requirement

\*\* Students pursuing the computer science concentration take CSE 231 instead of EGR 102. Students pursuing the business analytics concentration take CMSE 202 instead of EGR 102.

### 3. Major Requirements: (62-82)

#### a. Complete all of the following courses: (41)

|            |                                        |   |
|------------|----------------------------------------|---|
| ACC 230    | Survey of Accounting Concepts          | 3 |
| CE 221     | Statics                                | 3 |
| CEM 161    | Chemistry Laboratory I                 | 1 |
| EC 201     | Introduction to Microeconomics         | 3 |
| EC 202     | Introduction to Macroeconomics         | 3 |
| ECE 345    | Electronic Instrumentation and Systems | 3 |
| ENE/CE 371 | Sustainable Civil & Env Engr Systems   | 3 |
| AESC 110   | AES as a Profession                    | 1 |
| AESC 210   | Global Sys: Econ, Engr, Environment    | 3 |
| AESC 310   | Sustainable Systems Analysis           | 3 |
| AESC 410   | Capstone Project Applied Engr Sci (W)  | 3 |
| ME 201     | Thermodynamics                         | 3 |
| ME 280     | Graphic Communications                 | 2 |
| MKT 317    | Market Analytics                       | 3 |
| MSE 250    | Materials Science and Engineering      | 3 |
| PHY 191    | Physics Lab for Scientists I           | 1 |

#### b. Select one of the following courses: (3)

|         |                                      |   |
|---------|--------------------------------------|---|
| COM 225 | Intro to Interpersonal Communication | 3 |
| MGT 325 | Management Skills and Processes      | 3 |

#### c. Select one of the following courses: (3-4)

|            |                                           |   |
|------------|-------------------------------------------|---|
| STT 351    | Probability & Statistics for Engineering  | 3 |
| ***STT 380 | Probability & Statistics for Data Science | 4 |

\*\*\* Students pursuing the business analytics concentration need to take STT 380

### d. Concentrations: (15-38)

In consultation with their academic advisor, students must select one of the following concentrations: business analytics, business law, computer science, packaging, supply chain management or technical sales. For students interested in computer science, the minimum criteria for acceptance is the completion of Computer Science and Engineering 231 and 260 with a combined grade-point average in those two courses of 3.0. **Students in the business analytics concentration must complete the data science minor.** The concentration and any additional minors will be noted on the student's academic record.

#### Business Analytics: (38)

##### 1. All of the following courses: (15)

|         |                                   |   |
|---------|-----------------------------------|---|
| EC 301  | Intermediate Microeconomics       | 3 |
| FI 320  | Introduction to Finance           | 3 |
| GBL 385 | Business Law & Ethical Leadership | 3 |
| MKT 327 | Introduction to Marketing         | 3 |
| SCM 303 | Introduction to Supply Chain Mgt  | 3 |

##### 2. All of the following courses: (23 Data Science Minor)

|          |                                           |   |
|----------|-------------------------------------------|---|
| CMSE 201 | Computational Modeling & Data Anlys I     | 4 |
| CMSE 202 | Computational Modeling & Data Anlys II    | 4 |
| CMSE 381 | Fundamentals of Data Sci Methods          | 4 |
| MTH 314  | Matrix Algebra w/Computational Apps       | 3 |
| STT 180  | Introduction to Data Science              | 4 |
| STT 380  | Probability & Statistics for Data Science | 4 |

#### Business Law: (16-17)

##### 1. All of the following courses: (13)

|         |                                                                       |   |
|---------|-----------------------------------------------------------------------|---|
| EC 301  | Intermediate Microeconomics                                           | 3 |
| EC 425  | Law and Economics (W)                                                 | 3 |
| GBL 385 | Business Law & Ethical Leadership                                     | 3 |
| GBL 480 | Environmental Law & Sustainability for Business: From Local to Global | 3 |
| PHY 192 | Physics Laboratory for Scientists II                                  | 1 |

##### 2. One of the following courses: (3-4)

|         |                           |   |
|---------|---------------------------|---|
| PHL 345 | Business Ethics           | 4 |
| PHL 354 | Philosophy of Law         | 3 |
| PLS 320 | Judicial Politics         | 3 |
| PLS 321 | Constitutional Law        | 3 |
| PLS 322 | Comparative Legal Systems | 3 |



**Computer Science: (18-19)**

**1. All of the following courses: (12)**

|         |                                     |   |
|---------|-------------------------------------|---|
| CSE 231 | Introduction to Programming I       | 4 |
| CSE 232 | Introduction to Programming II      | 4 |
| CSE 260 | Discrete Structures in Computer Sci | 4 |

**2. Two of the following courses: (6-7)**

|         |                                              |   |
|---------|----------------------------------------------|---|
| CSE 320 | Computer Organization & Architecture         | 3 |
| CSE 325 | Computer Systems                             | 3 |
| CSE 331 | Algorithms and Data Structures               | 3 |
| CSE 335 | Object-Oriented Software Design              | 4 |
| CSE 404 | Introduction to Machine Learning             | 3 |
| CSE 420 | Computer Architecture                        | 3 |
| CSE 429 | Interdisciplinary Topics in Cyber Security   | 3 |
| CSE 431 | Algorithm Engineering                        | 3 |
| CSE 440 | Intro to Artificial Intelligence             | 3 |
| CSE 471 | Media Processing & Multimedia Computing      | 3 |
| CSE 472 | Computer Graphics                            | 3 |
| CSE 476 | Mobile Application Development               | 3 |
| CSE 477 | Web Application Architecture and Development | 3 |
| CSE 480 | Database Systems                             | 3 |
| CSE 482 | Big Data Analysis                            | 3 |

**Packaging: (17)**

|         |                                     |   |
|---------|-------------------------------------|---|
| CEM 143 | Survey of Organic Chemistry         | 4 |
| PKG 101 | Principles of Packaging             | 3 |
| PKG 221 | Packaging with Glass and Metal      | 2 |
| PKG 322 | Packaging with Paper and Paperboard | 4 |
| PKG 323 | Packaging with Plastics             | 4 |

**Supply Chain Management: (15)**

|         |                                    |   |
|---------|------------------------------------|---|
| FI 320  | Introduction to Finance            | 3 |
| MKT 327 | Introduction to Marketing          | 3 |
| SCM 303 | Introduction to Supply Chain Mgt   | 3 |
| SCM 371 | Procurement & Supply Management    | 3 |
| SCM 372 | Manufacturing Planning and Control | 3 |

*Note: Suggested Elective SCM 373*

**Technical Sales: (18)**

|         |                                       |   |
|---------|---------------------------------------|---|
| COM 360 | Advanced Sales Communication          | 3 |
| COM 483 | Practicum in Sales Communication      | 1 |
| FI 320  | Introduction to Finance               | 3 |
| MGT 474 | Negotiations                          | 2 |
| MKT 313 | Personal Selling and Buying Processes | 3 |
| MKT 327 | Introduction to Marketing             | 3 |
| MKT 383 | Sales Management                      | 3 |

*Note: COM 483 requires a sales based internship*

**Other Electives (Variable)**

**Total Credits Required for Degree 121**

**Total Credits Required for Degree with a concentration in Business Analytics and a Data Science Minor 133**

**Last revised April 2021**

**The requirements listed above apply to students admitted to the major of Applied Engineering Sciences in the Engineering Undergraduate Studies Office (UGS) beginning Fall 2021. The Engineering Undergraduate Studies Office constantly reviews requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with their advisor to obtain assistance in planning and appropriate schedule of courses. Students who have questions about Applied Engineering Sciences should contact the Engineering Undergraduate Studies Advising Office, 1424 Engineering Building, phone (517) 432-1352.**

## Applied Engineering Sciences

### Sample Program

| Freshman Year |           |              |              | Sophomore Year |           |              |           |
|---------------|-----------|--------------|--------------|----------------|-----------|--------------|-----------|
| Fall          | Credits   | Spring       | Credits      | Fall           | Credits   | Spring       | Credits   |
| AESC 110      | 1         | CEM 161      | 1            | EC 201         | 3         | AESC 210     | 3         |
| CEM 141       | 4         | PHY 183      | 4            | PHY 191        | 1         | CE 221       | 3         |
| EGR 100       | 2         | EGR 102      | 2            | MTH 234        | 4         | EC 202       | 3         |
| MTH 132       | 3         | MTH 133      | 4            | ISS 2XX        | 4         | ACC 230      | 3         |
| WRA 101       | 4         | Bioscience   | 3/4          | IAH 201-210    | 4         | MTH 235      | 3         |
| <b>Total</b>  | <b>14</b> | <b>Total</b> | <b>14/15</b> | <b>Total</b>   | <b>16</b> | <b>Total</b> | <b>15</b> |

  

| Junior Year  |           |              |           | Senior Year           |           |              |           |
|--------------|-----------|--------------|-----------|-----------------------|-----------|--------------|-----------|
| Fall         | Credits   | Spring       | Credits   | Fall                  | Credits   | Spring       | Credits   |
| AESC 310     | 3         | CONC         | 3         | CONC                  | 3         | AESC 410     | 3         |
| ME 201       | 3         | ME 280       | 2         | CONC                  | 3         | CONC         | 3         |
| PHY 184      | 4         | MKT 317      | 3         | MGT 325 or<br>COM 225 | 3         | CONC         | 3         |
| STT 351      | 3         | ISS 3XX      | 4         | MSE 250               | 3         | ECE 345      | 3         |
| ENE/CE 371   | 3         | IAH 211 or > | 4         | Elective              | 3         | Elective     | 3         |
| <b>Total</b> | <b>16</b> | <b>Total</b> | <b>16</b> | <b>Total</b>          | <b>15</b> | <b>Total</b> | <b>15</b> |

### Program Objectives

The Applied Engineering Sciences (AES) major is an undergraduate BS degree program in the MSU College of Engineering. AES is a multidisciplinary program that integrates core studies in mathematics, statistics, and science, core studies in multiple engineering disciplines, and core studies in business fundamentals and management. Built on this strong technical and business base, an AES student completes their studies by selecting one of six concentration areas: business analytics, business law, computer science, packaging, supply chain management, or technical sales.

AES is focused on developing strong problem solvers who have good people skills, and who bring to their workplace an integrated approach to understanding and managing complex business and engineered systems. More specifically, the AES program objectives are for each AES graduate to have the ability to:

- apply an integrated knowledge of engineering and business to problem solving, and;
- effectively function at the interfaces of engineering, design, production, procurement, marketing, distribution, sales, and management;
- effectively function in work teams, including functioning as a manager and a leader;
- effectively communicate in oral, written, and new media contexts;
- effectively apply the strengths of a technically based education to all problem solving contexts, and;
- effectively demonstrate the nimbleness and flexibility to respond to new types of problems and new opportunities based on being a lifelong learner.