

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 120

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. For scheduling academic advising appointments visit: <https://student.msu.edu/>

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
Total	14	Total	14/15	Total	16	Total	15

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 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	2
Total	16	Total	16	Total	15	Total	14

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.