Mechanical Engineering (MEEG)

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The mechanical engineering program is designed to offer a high-quality course of instruction involving classroom, laboratory, and extracurricular activities that results in graduates who are qualified and prepared to meet the demands of a professional career in the present and future work place and be able to assume a responsible place of leadership in a complex technological society.

The mission of the department is three-fold:

- Teaching — To provide a high-quality educational experience for undergraduate and graduate students that enables them to become leaders in their chosen professions.
- Research — To create, explore, and develop innovations in engineering and science through undergraduate and graduate research.
- Service — To provide beneficial service to the local, state, national, and international industries and communities via educational, technical, entrepreneurial, and professional activities.

The courses offered in mechanical engineering provide the student with a broad understanding of fundamental scientific principles that serve as a background for many fields of specialization. The undergraduate curriculum is designed to stress basic engineering principles and to assist in developing creative thinking. Emphasis is placed on the science and art of designing machines and systems, of converting energy into useful forms, and developing a basic understanding of engineering mechanics.

Completion of the degree requirements provides graduates with the following learning outcomes and ability to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
- Communicate effectively with a range of audiences;
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; and Student Graduation; and,
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

The BSME Program Educational Objectives are to produce graduates who, within a few years of graduation, are expected to:

1. Contribute to the economic development of Arkansas and the world through the practice of Mechanical Engineering;
2. Meet or exceed the needs and expectations of mechanical engineering employers in industry, government, and private practice;
3. Engage in professional activities that promote the mechanical engineering profession and provide continuing self-development, and develop leadership potential;
4. Succeed in graduate study and research, if pursued; and
5. Become licensed professional engineers, if pursued.

Requirements for B.S. in Mechanical Engineering

Requirements for the B.S.M.E.: The Bachelor of Science in Mechanical Engineering curriculum includes, in addition to the required 18 hours of history, government, fine arts/humanities/social science elective courses, a total of 12 hours of technical and science electives. A student must select all electives with the approval of his or her adviser. The fine arts/humanities/social science electives must be selected from the State Minimum Core (http://catalog.uark.edu/undergraduatecatalog/gened/stateminimum/) in the Academic Regulations chapter for university requirements for the program. It is expected that technical and science electives will be chosen to provide a coherent program within one or more areas of specialization or options available to mechanical engineers. Traditional areas of specialization are available in mechanical systems, materials, and energy systems. Other areas include pre-medical, management, and aerospace.

The first-year curriculum is essentially the same as prescribed for all engineering freshmen. Students entering the mechanical engineering program are required to take two, four hour laboratory based science electives. One of the four hour science electives must be PHYS 20404. The other four hour science elective must be chosen from one of the following:

ASTR 20003 & ASTR 20001	Survey of the Universe (ACTS Equivalency = PHSC 1204 Lecture) and Survey of the Universe Laboratory (ACTS Equivalency = PHSC 1204 Lab)	4
BIOL 10103 & BIOL 10101	Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)	4

BIOL 24103 & BIOL 24101	Human Physiology (ACTS Equivalency = BIOL 2414 Lecture) and Human Physiology Laboratory (ACTS Equivalency = BIOL 2414 Lab)	4
CHEM 14203 & CHEM 14201	University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)	4
GEOL 11103 & GEOL 11101	Physical Geology (ACTS Equivalency = GEOL 1114 Lecture) and Physical Geology Laboratory (ACTS Equivalency = GEOL 1114 Lab)	4
PHYS 20504	University Physics III	4
PHYS 35404	Optics	4
PHYS 36103 & PHYS 3610V	Modern Physics and Modern Physics Laboratory	4

Fine Arts/Humanities/Social Science Electives

Students must follow the University Core curriculum in selecting their history, government, fine arts, humanities, and social science electives. Each student in the College of Engineering is required to complete 18 semester hours in the humanities and social sciences.

The courses taken must include:

HIST 20003	History of the American People to 1877 (ACTS Equivalency = HIST 2113)	3
or HIST 20103	History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)	
or PLSC 20003	American National Government (ACTS Equivalency = PLSC 2003)	
ECON 21403	Basic Economics: Theory and Practice	3
or ECON 2103	Principles of Macroeconomics (ACTS Equivalency = ECON 2103)	
CLST 10003	Introduction to Classical Studies: Greece	3
or CLST 100H3	Honors Introduction to Classical Studies: Greece	
or CLST 10103	Introduction to Classical Studies: Rome	
or PHIL 20003	Introduction to Philosophy	
or PHIL 21003	Introduction to Ethics (ACTS Equivalency = PHIL 1003)	
or PHIL 21003	Introduction to Ethics (ACTS Equivalency = PHIL 1003)	

The remaining three courses must be selected from an approved list. The humanities and social sciences chart from the State Minimum Core (http://catalog.uark.edu/undergraduatecatalog/gened/stateminimum/) page should be used as a guide for selecting these courses.

Mechanical Engineering Concentration Electives

The purpose of technical/science electives is to provide students with the opportunity to expand their education along lines of particular interest to them.

As part of the mechanical engineering curriculum, students are required to complete 12 hours of technical/science electives. These electives can be categorized into three groups: Mechanical Engineering Electives, Other Engineering Electives, and Science-Math Electives.

1. Mechanical Engineering Electives. All mechanical engineering courses at or above the 40000 level not already required in the B.S.M.E. curriculum are acceptable. Special Project courses, MEEG 4910V, are allowed as electives only after approval in advance by the department head.
2. Other Engineering Electives. The rules governing the selection of engineering electives are:
   Engineering or Computer Science/Computer Engineering courses at or above the 30000 level not already required in the B.S.M.E. curriculum are allowed as technical-science electives. Courses with content remedial to required courses are not allowed, and courses considered redundant to required courses are not allowed.
3. Science-Math Electives. The approved list of science and math courses accepted as technical-science electives (https://mechanical-engineering.uark.edu/Academics/undergraduate-students/forms-and-resources/) is available.

Mechanical Engineering B.S.M.E. Eight-Semester Degree Program

The following section contains the list of courses required for the Bachelor of Science in Mechanical Engineering degree and a suggested sequence. Not all courses are offered every semester, so students who deviate from the suggested sequence must pay careful attention to course scheduling and course prerequisites. Students interested in obtaining a sequencing schedule of courses may contact the Mechanical Engineering office.

Students wishing to follow the eight-semester degree plan should see the Eight-Semester Degree Policy (http://catalog.uark.edu/undergraduatecatalog/academicregulations/eightsemesterdegreecompletionpolicy/) in the Academic Regulations chapter for university requirements of the program.

Either the science elective in the second semester of Year 1 or the science elective in the first semester of Year 2 must include PHYS 20404. Other science electives should be chosen from an approved list. See the mechanical engineering office.

First Year	Units	
	Fall	Spring
ENGL 10103 Composition I (ACTS Equivalency = ENGL 1013) (Satisfies General Education Outcome 1.1)	3	
CHEM 14103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture)	3	
MATH 24004 Calculus I (ACTS Equivalency = MATH 2405) (Satisfies General Education Outcome 2.1)[1]	4	
GNEG 11101 Introduction to Engineering I	1	
Select one of the following (Satisfies General Education Outcome 4.2):	3	
HIST 20003 History of the American People to 1877 (ACTS Equivalency = HIST 2113)		
HIST 20103 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)		
PLSC 20003 American National Government (ACTS Equivalency = PLSC 2003)		
GNEG 11201 Introduction to Engineering II		1
MATH 25004 Calculus II		4

Freshman Science Elective (See Above) (Satisfies General Education Outcome 3.4)[2]		4
ENGL 10303 Technical Composition II (ACTS Equivalency = ENGL 1023) (Satisfies General Education Outcome 1.2)		3
PHYS 20304 University Physics I (ACTS Equivalency = PHYS 2034)		4
Year Total:	14	16

Second Year		**Units**
	Fall	**Spring**
MEEG 21031 Computer-aided Design	1	
Science Elective (See Note Above)	4	
MATH 26004 Calculus III	4	
MEEG 23003 Introduction to Materials	3	
MEEG 20003 Statics	3	
MATH 25804 Elementary Differential Equations		4
MEEG 20103 Dynamics		3
MEEG 24003 Thermodynamics		3
MEEG 27003 Computer Methods in Mechanical Engineering		3
MEEG 21003 Mechanical Design and Manufacturing		3
Year Total:	15	16

Third Year		**Units**
	Fall	**Spring**
MEEG 30103 Mechanics of Materials	3	
MEEG 31103 Fundamentals of Vibrations	3	
MEEG 32002 Mechanical Engineering Laboratory I	2	
MEEG 35003 Mechanics of Fluids	3	
ELEG 39003 Electric Circuits and Machines	3	
ECON 21003 Principles of Macroeconomics (ACTS Equivalency = ECON 2103) (Satisfies General Education Outcome 3.3) or ECON 21403 Basic Economics: Theory and Practice	3	
MEEG 32102 Mechanical Engineering Laboratory II		2
MEEG 44103 Heat Transfer		3
MEEG 41003 Machine Element Design		3
MEEG 32203 Introduction to Mechatronics		3
Technical/Science Elective		3
Humanities State Minimum Core Elective (Satisfies General Education Outcomes 3.2 and 5.1): CLST 10003 Introduction to Classical Studies: Greece or CLST 100H3 Honors Introduction to Classical Studies: Greece or CLST 10103 Introduction to Classical Studies: Rome or PHIL 20003 Introduction to Philosophy or PHIL 21003 Introduction to Ethics (ACTS Equivalency = PHIL 1003) or PHIL 21003 Introduction to Ethics (ACTS Equivalency = PHIL 1003)		3
Year Total:	17	17

Fourth Year		**Units**
	Fall	**Spring**
MEEG 41302 Professional Engineering Practices	2	
MEEG 41802 Creative Project Design I	2	
MEEG 42002 Mechanical Engineering Laboratory III	2	
MEEG 44803 Thermal Systems Analysis and Design	3	
Technical/Science Elective	3	
Fine Arts State Minimum Core Elective (Satisfies General Education Outcome 3.1)[3]	3	
MEEG 41902 Creative Project Design II (Satisfies General Education Outcome 6.1)		2
Two Technical/Science Elective		6
Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3)[4]		3
Social Sciences State Minimum Core Elective (Satisfies General Education Outcomes 3.3 and 4.1)[5]		3
Year Total:	15	14

Total Units in Sequence:	**124**

1 Students have demonstrated successful completion of the learning indicators identified for learning outcome 2.1, by meeting the prerequisites for MATH 24004.

2 The Freshman Science Elective courses that satisfy General Education Outcome 3.4 include: ASTR 20003/ASTR 20001, BIOL 10103/BIOL 10101, BIOL 24103/BIOL 24101, CHEM 14203/CHEM 14201, GEOL 11103/GEOL 11101.

3 The Fine Arts Elective courses that satisfy General Education Outcome 3.1 include: ARCH 10003, ARHS 10003, COMM 10003, DANC 10003, LARC 10003, MUSC 10003, MUSC 100H3, MUSC 10103, MUSC 101H3, MUSC 13303, THTR 10003, THTR 10103, or THTR 101H3.

4 The Social Sciences Elective courses which satisfy General Education Outcome 3.3 include: AGEC 11003, AGEC 21003, ANTH 10203, COMM 10203, ECON 21003, ECON 22003, ECON 21403, EDST 20003, HDFS 14003, HDFS 24103, HDFS 26003, HIST 11193, HIST 111H3, HIST 11293, HIST 112H3, HIST 20003, HIST 20103, HIST 20903, HUMN 111H4, HUMN 211H4, INST 28103, INST 281H3, PLSC 20003,PLSC 20103, PLSC 21003, PLSC 28103, PLSC 281H3, PSYC 20003, RESM 28503, SOCI 10103, SOCI 101H3, or SOCI 20103. Note, courses cannot be counted twice in degree requirements.

5 The Social Sciences Elective courses which satisfy General Education Outcomes 3.3 and 4.1 include: ANTH 10203, COMM 10203, HDFS 14003, HDFS 24103, HIST 11193,HIST 111H3, HIST 11293, HIST 112H3, HIST 20903, HUMN 111H4, HUMN 211H4, INST 28103, INST 281H3, PLSC 20103, PLSC 28103, PLSC 281H3, RESM 28503, SOCI 10103, SOCI 101H3, or SOCI 20103.

B.S. in Mechanical Engineering with Aerospace Concentration

Requirements for the B.S.M.E.: The Bachelor of Science in Mechanical Engineering curriculum includes, in addition to the required 18 hours of

history, government, fine arts/humanities/social science elective courses, a total of 12 hours of technical and science electives. A student must select all electives with the approval of his or her adviser. The fine arts/humanities/social science electives must be selected from the State Minimum Core (http://catalog.uark.edu/undergraduatecatalog/gened/stateminimum/) in the Academic Regulations chapter for university requirements for the program. It is expected that technical and science electives will be chosen to provide a coherent program within one or more areas of specialization or options available to mechanical engineers. Traditional areas of specialization are available in mechanical systems, materials, and energy systems. Other areas include pre-medical, management, and aerospace.

The first-year curriculum is essentially the same as prescribed for all engineering freshmen. Students entering the mechanical engineering program are required to take two, four hour laboratory based science electives. One of the four hour science electives must be PHYS 20404. The other four hour science elective must be chosen from one of the following:

ASTR 20003 & ASTR 20001	Survey of the Universe (ACTS Equivalency = PHSC 1204 Lecture) and Survey of the Universe Laboratory (ACTS Equivalency = PHSC 1204 Lab)	4
BIOL 10103 & BIOL 10101	Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) and Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)	4
BIOL 24103 & BIOL 24101	Human Physiology (ACTS Equivalency = BIOL 2414 Lecture) and Human Physiology Laboratory (ACTS Equivalency = BIOL 2414 Lab)	4
CHEM 14203 & CHEM 14201	University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) and University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)	4
GEOL 11103 & GEOL 11101	Physical Geology (ACTS Equivalency = GEOL 1114 Lecture) and Physical Geology Laboratory (ACTS Equivalency = GEOL 1114 Lab)	4
PHYS 20504	University Physics III	4
PHYS 35404	Optics	4
PHYS 36103 & PHYS 3610V	Modern Physics and Modern Physics Laboratory	4

Fine Arts/Humanities/Social Science Electives

Students must follow the University Core curriculum in selecting their history, government, fine arts, humanities, and social science electives. Each student in the College of Engineering is required to complete 18 semester hours in the humanities and social sciences.

The courses taken must include:

HIST 20003	History of the American People to 1877 (ACTS Equivalency = HIST 2113)	3
or HIST 20103	History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)	
or PLSC 20003	American National Government (ACTS Equivalency = PLSC 2003)	
ECON 21403	Basic Economics: Theory and Practice	3
or ECON 21003	Principles of Macroeconomics (ACTS Equivalency = ECON 2103)	
CLST 10003	Introduction to Classical Studies: Greece	3
or CLST 100H3	Honors Introduction to Classical Studies: Greece	
or CLST 10103	Introduction to Classical Studies: Rome	
or PHIL 20003	Introduction to Philosophy	
or PHIL 21003	Introduction to Ethics (ACTS Equivalency = PHIL 1003)	
or PHIL 21003	Introduction to Ethics (ACTS Equivalency = PHIL 1003)	

The remaining three courses must be selected from an approved list. The humanities and social sciences chart from the State Minimum Core (http://catalog.uark.edu/undergraduatecatalog/gened/stateminimum/) page should be used as a guide for selecting these courses.

Requirements for Aerospace Concentration: The Aerospace Concentration in Mechanical Engineering provides students an opportunity to concentrate on engineering and scientific issues associated with aircraft, spacecraft and space exploration. The Aerospace Concentration consists of the 112-credit hour Mechanical Engineering B.S. core plus 12 hours of specified elective courses.

Select at least two courses from the following list of primary courses:		6
MEEG 45003	Introduction to Flight	
MEEG 45203	Astronautics	
MEEG 44303	Aerospace Propulsion	
MEEG 55003	Advanced Fluid Dynamics I	
MEEG 55303	Fundamentals of Aerodynamics	
If needed, select additional courses that meet the following requirements:		6
Any MEEG 4000 and 5000 electives pre-approved by the Aerospace and MEEG Curriculum Committees		
Any 3000 level or above ASTR, GEOS, and SPAC courses pre-approved by the Aerospace and MEEG Curriculum Committees		
One course from either MEEG 490H3 Honors Research (for honors students only) or MEEG 4920V (or MEEG 5920V) Special Projects (3 hours)		

B.S.M.E. with Aerospace Concentration Eight-Semester Plan

First Year	Units	
	Fall	Spring
ENGL 10103 Composition I (ACTS Equivalency = ENGL 1013) (Satisfies General Education Outcome 1.1)	3	
CHEM 14103 University Chemistry I (ACTS Equivalency = CHEM 1414 Lecture)	3	
MATH 24004 Calculus I (ACTS Equivalency = MATH 2405) (Satisfies General Education Outcome 2.1)[1]	4	
GNEG 11101 Introduction to Engineering I	1	
Select one of the following to satisfy General Education Outcome 4.2:	3	
HIST 20003 History of the American People to 1877 (ACTS Equivalency = HIST 2113)		

HIST 20103 History of the American People, 1877 to Present (ACTS Equivalency = HIST 2123)		
PLSC 20003 American National Government (ACTS Equivalency = PLSC 2003)		
GNEG 11201 Introduction to Engineering II		1
PHYS 20304 University Physics I (ACTS Equivalency = PHYS 2034) (Satisfies General Education Outcome 3.4)		4
MATH 25004 Calculus II		4
ENGL 10303 Technical Composition II (ACTS Equivalency = ENGL 1023) (Satisfies General Education Outcome 1.2)		3
Freshman Science Elective, select one of the following:		4
ASTR 20003 Survey of the Universe (ACTS Equivalency = PHSC 1204 Lecture) & ASTR 20001 Survey of the Universe Laboratory (ACTS Equivalency = PHSC 1204 Lab)		
BIOL 10103 Principles of Biology (ACTS Equivalency = BIOL 1014 Lecture) & BIOL 10101 Principles of Biology Laboratory (ACTS Equivalency = BIOL 1014 Lab)		
BIOL 24103 Human Physiology (ACTS Equivalency = BIOL 2414 Lecture) & BIOL 24101 Human Physiology Laboratory (ACTS Equivalency = BIOL 2414 Lab)		
CHEM 14203 University Chemistry II (ACTS Equivalency = CHEM 1424 Lecture) & CHEM 14201 University Chemistry II Laboratory (ACTS Equivalency = CHEM 1424 Lab)		
GEOL 11103 Physical Geology (ACTS Equivalency = GEOL 1114 Lecture) & GEOL 11101 Physical Geology Laboratory (ACTS Equivalency = GEOL 1114 Lab)		
PHYS 20504 University Physics III		
PHYS 35404 Optics		
PHYS 36103 Modern Physics & PHYS 3610V Modern Physics Laboratory		
Year Total:	14	16

Second Year	**Units**	
	Fall	**Spring**
MATH 26004 Calculus III	4	
PHYS 20404 University Physics II (ACTS Equivalency = PHYS 2044 Lecture) (Satisfies General Education Outcome 3.4)	4	
MEEG 20003 Statics	3	
MEEG 21031 Computer-aided Design	1	
MEEG 23003 Introduction to Materials	3	
MATH 25804 Elementary Differential Equations		4
MEEG 20103 Dynamics		3
MEEG 21003 Mechanical Design and Manufacturing		3
MEEG 24003 Thermodynamics		3
MEEG 27003 Computer Methods in Mechanical Engineering		3
Year Total:	15	16

Third Year	**Units**	
	Fall	**Spring**
ELEG 39003 Electric Circuits and Machines	3	
ECON 21003 Principles of Macroeconomics (ACTS Equivalency = ECON 2103) (Satisfies General Education Outcome 3.3) or ECON 21403 Basic Economics: Theory and Practice	3	
MEEG 30103 Mechanics of Materials	3	
MEEG 31103 Fundamentals of Vibrations	3	
MEEG 32002 Mechanical Engineering Laboratory I	2	
MEEG 35003 Mechanics of Fluids	3	
MEEG 32203 Introduction to Mechatronics		3
Humanities State Minimum Core Elective (Select a course which satisfies General Education Outcomes 3.2 and 5.1)[2]		3
MEEG 32102 Mechanical Engineering Laboratory II		2
MEEG 41003 Machine Element Design		3
MEEG 44103 Heat Transfer		3
Aerospace Technical Science Elective		3
Year Total:	17	17

Fourth Year	**Units**	
	Fall	**Spring**
MEEG 41802 Creative Project Design I	2	
MEEG 41302 Professional Engineering Practices	2	
MEEG 42002 Mechanical Engineering Laboratory III	2	
MEEG 44803 Thermal Systems Analysis and Design	3	
Fine Arts State Minimum Core Elective (Satisfies General Education Outcome 3.1)[3]	3	
Aerospace Technical Science Elective	3	
MEEG 41902 Creative Project Design II (Satisfies General Education Outcome 6.1)		2
Social Sciences State Minimum Core Elective (Satisfies General Education Outcome 3.3)[4]		3
Social Sciences State Minimum Core Elective (Satisfies General Education Outcomes 3.3 and 4.1)[5]		3
Aerospace Technical Science Elective		3
Aerospace Technical Science Elective		3
Year Total:	15	14

Total Units in Sequence:	**124**

[1] Students have demonstrated successful completion of the learning indicators identified for learning outcome 2.1, by meeting the prerequisites for MATH 24004.

[2] The Humanities Elective courses which satisfy General Education Outcomes 3.2 and 5.1 include: CLST 10003, CLST 100H3, CLST 10103, HUMN 112H4, PHIL 20003, PHIL 20003, PHIL 200H3, PHIL 21003.

[3] The Fine Arts Elective courses which satisfy General Education Outcome 3.1 include: ARCH 10003, ARHS 10003, COMM 10003, DANC 10003, LARC 10003, MUSC 10003, MUSC 100H3, MUSC 10103, MUSC101H3, MUSC 13303, THTR 10003, THTR 10103, or THTR 101H3.

[4] The Social Sciences Elective courses which satisfy General Education Outcome 3.3 include: AGEC 11003, AGEC 21003, ANTH 10203, COMM 10203, ECON 21003, ECON 22003, ECON 21403, EDST 20003, HDFS 14003, HDFS 24103, HDFS 26003, HIST 11193, HIST 111H3, HIST 11293, HIST 112H3, HIST 20003, HIST 20103, HIST 20903, HUMN 111H4, HUMN 211H4, INST 28103, INST 281H3, PLSC 20003, PLSC 20103, PLSC 21003, PLSC 28103, PLSC 281H3, PSYC 20003, RESM 28503, SOCI 10103, SOCI 101H3, or SOCI 20103.

[5] The Social Sciences Elective courses which satisfy General Education Outcomes 3.3 and 4.1 include: ANTH 10203, COMM 10203, HDFS 14003, HDFS 24103, HIST 11193,HIST 111H3, HIST 11293, HIST 112H3, HIST 20903, HUMN 111H4, HUMN 211H4, INST 28103, INST 281H3, PLSC 20103, PLSC 28103, PLSC 281H3, RESM 28503, SOCI 10103, SOCI 101H3, or SOCI 20103.
Note, courses cannot be counted twice in degree requirements.

Almahakeri, Mohamed, Ph.D., M.S.M.E. (Queen's University), Teaching Assistant Professor, 2020.
Bailey, Jason T., M.S.M.E (University of Arkansas), Advanced Instructor, 2019, 2024.
Campbell, Jennifer, Ph.D. (University of Virginia), Assistant Professor, 2023.
Davis, James Allen, Ph.D., M.S.M.E., B.S.M.E. (University of Arkansas), Teaching Assistant Professor, 1997, 2018.
Hamilton, John H., M.S., B.S. (University of Arkansas), Advanced Instructor, 2002, 2024.
Hu, Han, Ph.D. (Drexel University), Assistant Professor, 2019.
Huang, Po-Hao Adam, Ph.D., M.S., B.S. (University of California-Los Angeles), Associate Professor, 2006, 2012.
Huitink, David, Ph.D., M.S.M.E., B.S.M.E. (Texas A&M University), Associate Professor, 2016, 2022.
Jensen, David C., Ph.D., M.S., B.S. (Oregon State University), Associate Professor, 2012, 2018.
Leylek, Jim, Ph.D. (University of Illinois-Urbana-Champaign), M.S., B.S. (University of Illinois at Chicago), Professor, 2011.
Majumdar, Neelaskshi, Ph.D. (Purdue University), Assistant Professor, 2023.
Meng, Xiangbo, Ph.D. (University of Western Ontario), M.S.E.E. (China University of Petroleum), B.S.C.E. (Northwestern University), Associate Professor, 2016, 2022.
Millett, Paul, Ph.D., M.S. (University of Arkansas), B.E. (Vanderbilt University), Associate Professor, Twenty-First Century Professor, 2013, 2019.
Nutter, Darin W., Ph.D. (Texas A&M University), M.S.M.E., B.S.M.E. (Oklahoma State University), Professor, Twenty-First Century Leadership Chair in Engineering, 1994, 2012.
Roberts, Monty, M.S., B.S. (University of Arkansas), Advanced Instructor, 2011, 2024.
Roe, Larry, Ph.D. (University of Florida), M.S., B.S.M.E. (University of Mississippi), Associate Professor, 1994, 2000.
Shou, Wan, Ph.D. (Missouri University of Science and Technology), M.S.M.E. (University of Louisiana at Lafayette), B.E. (Tianjin Polytechnic University), Assistant Professor, 2021.
Tung, Steve, Ph.D., M.S.M.E. (University of Houston), B.S.M.E. (National Taiwan University), Professor, 2000, 2013.
Walter, Keith D., Ph.D., M.S., B.S. (Clemson University), Professor, Twenty-First Century Professorship, 2021.
Wejinya, Uchechukwu C., Ph.D., M.S., B.S. (Michigan State University), Associate Professor, Twenty-First Century Professor, 2008, 2014.
Zhou, Wenchao, Ph.D. (Georgia Institute of Technology), M.S.M.E. (Xi'an Jiaotong University, Xi'an, China), B.S.M.E. (Huazhong University of Science and Technology, Wuhan, China), Associate Professor, 2014, 2020.
Zou, Min, Ph.D., M.S.M.E. (Georgia Institute of Technology), M.S.A.E., B.S.A.E. (Northwestern Polytechnical University), Professor, Twenty-First Century Chair in Materials, Manufacturing and Integrated Systems, 2003, 2013.

Courses

MEEG 20003. Statics. 3 Hours.
Equilibrium and resultants of force systems in a plane and in space; analysis of structures, friction, centroids, moments of inertia, and virtual work method. Methods of analysis are emphasized. Corequisite: Drill component. Pre- or Corequisite: MATH 26004 or MATH 26004. Prerequisite: PHYS 20304. (Typically offered: Fall, Spring and Summer)

MEEG 20103. Dynamics. 3 Hours.
Kinematics and kinetics of particle and of rigid bodies; work and energy; impulse and momentum, and special topics. Corequisite: Drill component. Prerequisite: MEEG 20003 and MATH 26004. (Typically offered: Fall, Spring and Summer)

MEEG 21003. Mechanical Design and Manufacturing. 3 Hours.
Principles and tools to support the design and manufacture of products within constraints of cost and schedule. Students will learn how to develop and evaluate mechanical product designs and specify appropriate manufacturing methods for mechanical parts. This course will provide students with a systematic process to develop a product from the point of customer needs through conceptual design and to developing a functional prototype and specification of component's material, shape, and manufacturing processes. Corequisite: MEEG 20103. Prerequisite: MEEG 21031. (Typically offered: Spring and Summer)

MEEG 21031. Computer-aided Design. 1 Hour.
The concept and application of solid-modeling, based on SolidWorks Computer-Aided Design (CAD) software suite, are introduced in this course. They include sketches, parts modeling, assembly of parts, and drawing documentation. Prerequisite: GNEG 11201 or GNEG 112H1 or GNEG 11003. (Typically offered: Fall and Spring)

MEEG 23003. Introduction to Materials. 3 Hours.
A study of chemical, physical, and electrical properties of materials using fundamental atomistic approach. The materials of interest are: metals, polymers, ceramics, and composites. The interactive relationship between structure, properties, and processing of materials will be emphasized. For various engineering applications. Corequisite: Drill component. Prerequisite: MATH 24004, PHYS 20304 and CHEM 14103. (Typically offered: Fall and Spring)

MEEG 24003. Thermodynamics. 3 Hours.
A study of the 1st and 2nd laws of thermodynamics. Availability of energy, properties of liquids, gases, and vapors; nonflow and flow processes. Recitation 3 hours, drill 2 hours per week. Corequisite: Drill component. Prerequisite: PHYS 20304 and MATH 25004. (Typically offered: Fall, Spring and Summer)

MEEG 27003. Computer Methods in Mechanical Engineering. 3 Hours.
Use of computers and programming for solving engineering problems. Basic numerical methods including errors, equation solution, matrices, optimization, regression, integration, and differential equations. Corequisite: Drill component. Pre- or Corequisite: MATH 25804. (Typically offered: Spring and Summer)

MEEG 30103. Mechanics of Materials. 3 Hours.
Stress and deformation of members in tension, compression, torsion, and bending, and the design of these members. Columns, statically indeterminate beams, and simple connections. Corequisite: Drill component. Prerequisite: MEEG 20003. (Typically offered: Fall, Spring and Summer)

MEEG 301H3. Honors Mechanics of Materials. 3 Hours.
Stress and deformation of members in tension, compression, torsion, and bending, and the design of these members. Columns, statically indeterminate beams, and simple connections. Corequisite: Drill component. Prerequisite: MEEG 20003 and honors standing. (Typically offered: Fall, Spring and Summer)

MEEG 31103. Fundamentals of Vibrations. 3 Hours.
Time and frequency domain mathematical techniques for linear system vibrations are reviewed. Undamped system and viscously damped systems are analyzed. Equations of motion of single and multiple degrees-of-freedom systems are studied. Vibration of multi-degree-of-freedom systems are analyzed using modal analysis and modal summation methods. Eigenvalue problems as related vibrations are studied. Corequisite: Drill component. Prerequisite: MEEG 21003, MATH 25804 or MATH 25804, MEEG 27003, and MEEG 20103. (Typically offered: Fall and Spring)

MEEG 32002. Mechanical Engineering Laboratory I. 2 Hours.
Introduction to measurement, uncertainty, data acquisition, and instrumentation with an emphasis in materials and manufacturing. Corequisite: Drill component. Pre- or Corequisite: MEEG 30103 and ELEG 39003. Prerequisite: MEEG 23003 and PHYS 20404. (Typically offered: Fall and Spring)

MEEG 32102. Mechanical Engineering Laboratory II. 2 Hours.
Design and implementation of measurements, fabrication processes, data acquisition, and data analysis with emphasis in mechanical and fluid systems. Corequisite: Drill component. Prerequisite: MEEG 32002, MEEG 35003 and MEEG 31103. (Typically offered: Fall and Spring)

MEEG 32203. Introduction to Mechatronics. 3 Hours.
This course is an introduction to design and control the mechatronic system, which requires integration of the mechanical and electrical knowledge within a unified framework. The topics covered in this course include basic electronics, diodes, transistors, power amplifiers, digital logic, operation amplifier, motor design, encoder, and programming in Arduino. Corequisite: Lab component. Prerequisite: MEEG 32002. (Typically offered: Spring)

MEEG 35003. Mechanics of Fluids. 3 Hours.
A study of fluids including fluid properties, pressure, and flow fields utilizing conservation of mass, energy, and momentum principles. Prerequisite: MEEG 24003 or CHEG 23103. Pre- or Corequisite: MATH 25804. (Typically offered: Fall and Summer)

MEEG 40003. Intermediate Dynamics. 3 Hours.
Review of central-force motion of spacecraft, use of rotating reference frames, Coriolis acceleration. Kinematics of rigid bodies in 3-D space: velocities and accelerations in different moving reference frames, addition theorem of angular accelerations. Kinetics of rigid bodies in 3-D space: eigenvalues and eigenvectors of inertia matrices, momentum and kinetic energy of a rigid body in 3-D motion, Euler's equations of motion; precession, nutation, and spin of a gyroscope; forced steady precession, torque free steady precession, space cone, and body cone. Prerequisite: MEEG 20103. (Typically offered: Irregular)

MEEG 40203. Composite Materials: Analysis and Design. 3 Hours.
A study of fibrous composite materials with emphasis on mechanical behavior, synthesis, and application. Topics include macro- and micromechanical analysis lamina, lamina theory, failure analysis in design, and manufacturing techniques. Prerequisite: MEEG 30103. (Typically offered: Irregular)

MEEG 41003. Machine Element Design. 3 Hours.
This course introduces the static failure theories and fatigue failure theories, and how each of the theories can be applied in practical engineering problems in supporting the selection and design of machine elements. This course also introduces key design concepts, design principles, design process, and design guidelines for four commonly-used machine elements: spring, gear, bearing and shaft. Pre- or Corequisite: MEEG 31103. Prerequisite: MEEG 30103. (Typically offered: Fall, Spring and Summer)

MEEG 410H3. Honors Machine Element Design. 3 Hours.
This course introduces the static failure theories and fatigue failure theories, and how each of the theories can be applied in practical engineering problems in supporting the selection and design of machine elements. This course also introduces key design concepts, design principles, design process, and design guidelines for four commonly-used machine elements: spring, gear, bearing and shaft. Advanced project required of honors students. Advanced project required. (Typically offered: Fall, Spring and Summer)

MEEG 41203. Finite Element Methods I. 3 Hours.
Introduction to the use of the finite element method in mechanical engineering analysis and design. Use of commercial software to solve thermal and mechanical problems. Pre- or Corequisite: MEEG 30103 and MEEG 44103. (Typically offered: Irregular)

MEEG 41302. Professional Engineering Practices. 2 Hours.
Design proposal preparation, design codes, professional ethics, engineering economics, and the role of the engineer in society. Pre- or Corequisite: MEEG 41003 or MEEG 44803. (Typically offered: Fall and Spring)

MEEG 41403. Design for Safety. 3 Hours.
This course provides an overview of safety engineering and a framework from which the students can evaluate and develop mechanical and thermal systems from a safety perspective. Pre- or Corequisite: MEEG 44103. Prerequisite: MEEG 30103. (Typically offered: Irregular)

MEEG 41503. Fundamentals of Mechanical Design. 3 Hours.
This class is designed to provide engineering students with a head start in industry as design engineers or working in an engineering related function. The course contents cover machine design and analysis experiences as related to working in industry and performing consulting work. Major topics include the design process, design procedures, fasteners, general design and numerous consulting experiences. A concept design exercise and two special design projects will be assigned to the students as homework. Prerequisite: MEEG 41003. (Typically offered: Fall)

MEEG 41703. Model-Based Systems Design and Analysis. 3 Hours.
This course provides students with an introduction into the two main approaches to understanding and designing complex engineered systems. First, the course covers the unique technical challenge of systems engineering and design of systems. Second, the course covers concepts, methods and tools related to "model-based systems design." This covers formal modeling of the information content of complex systems. The third portion of the course will focus on modeling the complex behavior of the systems. This is often described as dynamical systems modeling. Students will utilize the methods and tools presented in class to model a complex engineered system of their choice (with instructor approval). The classes will alternate between presenting modeling methods to the students and students demonstrating their system to the class utilizing those methods. Students may not receive credit for both MEEG 41703 and MEEG 51703. Prerequisite: MEEG 41003 or Instructor consent. (Typically offered: Spring Even Years)

MEEG 41802. Creative Project Design I. 2 Hours.
Students will select a capstone design project, and each student group will prepare a formal written proposal on their project for presentation to a panel of judges. This group project will be carried to completion in MEEG 41902. Corequisite: MEEG 44803. Prerequisite: MEEG 41003 and MEEG 32102. (Typically offered: Fall and Spring)

MEEG 41902. Creative Project Design II. 2 Hours.
Students choose their capstone project from a list of approved engineering problems. During the course of two semesters, students will learn and apply the design process along with project management skills to deliver the solution on time and on budget as a team. For the first semester (CP1) the team will focus on design of the best solution and development of a complete engineering package necessary to move forward. In the final semester (CP2) the team will implement and test the performance of their solution. Prerequisite: MEEG 41802. (Typically offered: Fall and Spring)

MEEG 42002. Mechanical Engineering Laboratory III. 2 Hours.
Application of measurement techniques to mechanical engineering problems which emphasize mechanical and thermal systems. Corequisite: Drill component. Pre- or corequisite: MEEG 44803. Prerequisite: MEEG 32102 and MEEG 41003. (Typically offered: Fall, Spring and Summer)

MEEG 42103. Control of Mechanical Systems. 3 Hours.
Mathematical modeling for feedback control of dynamic mechanical systems with design techniques using LaPlace transforms, state variables, root locus, frequency analysis, and criteria for performance and stability. Prerequisite: MEEG 31103. (Typically offered: Irregular)

MEEG 42303. Microprocessors in Mechanical Engineering I: Electromechanical Systems. 3 Hours.
Microcomputer architectural, programming, and interfacing. Smart product design (microprocessor-based design). Control of DC and stepper motors and interfacing to sensors. Applications to robotics and real-time control. Mobile robot project. Digital and analog electronics are reviewed where required. Prerequisite: ELEG 39003. (Typically offered: Irregular)

MEEG 42503. Introduction to Robotics. 3 Hours.
This course serves as an introduction to robotics. The course covers the historical development of robotics as a field, and as mechatronic systems, the importance of integrating sensors, actuators and end-effectors. Topics covered in this course will include but not limited to the following: mathematical modeling of robots, rigid motions and homogeneous transformation, forward/inverse kinematics, and velocity kinematics. Prerequisite: MEEG 27003, MEEG 31103 and instructor consent. (Typically offered: Fall)

MEEG 43003. Materials Laboratory. 3 Hours.
A study of properties, uses, testing, and heat treatment of basic engineering materials and related analytical techniques. Corequisite: Lab component. Prerequisite: MEEG 23003. (Typically offered: Irregular)

MEEG 43103. Introduction to Tribology. 3 Hours.
A study of science and technology of interacting surfaces in relative motion. Topics include solid surface characterization, contact between solid surfaces, adhesion, friction, wear, lubrication, micro/nanotribology, friction and wear screening test methods, and tribological components and applications. Prerequisite: MEEG 30103 and MEEG 35003 or graduate standing. (Typically offered: Irregular)

MEEG 43303. Hybrid Electric Vehicles. 3 Hours.
This course is intended to provide an introduction to basics of hybrid and pure electrical vehicles (mainly passenger cars), covering history, architecture, constituents, working mechanisms, and key technologies. The course focuses on fundamental concepts of different hybrid electrical vehicles (HEVs) and their technical features and highlights the successes of the state-of-the-art pure electrical vehicles (EVs). In addition, this course will introduce various battery technologies used for electrical vehicles, covering traditional batteries, lithium-ion batteries, and batteries beyond lithium-ions. It is appropriate for engineering and natural science students interested in obtaining basic knowledge of hybrid and pure electrical vehicles to prepare for a career in developing alternate energy sources. Prerequisite: ELEG 39003 or BENG 31103, and senior standing. (Typically offered: Spring)

MEEG 44103. Heat Transfer. 3 Hours.
Basic thermal energy transport processes; conduction, convection, and radiation; and the mathematical analysis of systems involving these processes in both steady and time-dependent cases. Prerequisite: MEEG 35003. (Typically offered: Spring and Summer)

MEEG 44203. Power Generation. 3 Hours.
Study of design and operational aspects of steam, gas, and combined cycle power plants. Brief study of Nuclear and Alternative energy systems. Prerequisite: MEEG 35003. (Typically offered: Irregular)

MEEG 44303. Aerospace Propulsion. 3 Hours.
Principles, operation, and characteristics of gas turbine and rocket engines. Brief study of novel spacecraft propulsion systems. Prerequisite: MEEG 35003. (Typically offered: Irregular)

MEEG 44403. Machine Learning for Mechanical Engineers. 3 Hours.
This course covers an introduction to supervised and unsupervised learning algorithms for engineering applications, such as visualization-based physical quantity predictions, dynamic signal classification, and prediction, data-driven control of dynamical systems, surrogate modeling, and dimensionality reduction, among others. The lectures cover the fundamental concepts and examples of developing machine learning models using Python and MATLAB. This course includes four homework assignments to practice the application of different machine learning algorithms in specific mechanical engineering problems and a project assignment that gives the students the flexibility of selecting their topics to study using designated machine learning tools. Students are not allowed to take both MEEG 44403 and MEEG 54403 for credits. Prerequisite: MEEG 27003. (Typically offered: Fall)

MEEG 44503. Industrial Waste and Energy Management. 3 Hours.
Applications of thermodynamics, heat transfer, fluid mechanics, and electric machinery to the analysis of waste streams and energy consumption for industrial facilities. Current techniques and technologies for waste minimization and energy conservation including energy-consuming systems and processes, utility rate analysis, economic analysis and auditing are taught. Prerequisite: MEEG 44103. (Typically offered: Irregular)

MEEG 44703. Indoor Environmental Control. 3 Hours.
Gives student a thorough understanding of the fundamental theory of air conditioning design for commercial buildings, including calculating heating and cooling loads along with the proper selection and sizing of air conditioning equipment. Prerequisite: MEEG 44103. (Typically offered: Irregular)

MEEG 44803. Thermal Systems Analysis and Design. 3 Hours.
Analysis design and optimization of thermal systems and components with examples from such areas as power generation, refrigeration, and propulsion, Availability loss characteristics of energy systems and availability conservation methods. Prerequisite: MEEG 44103. (Typically offered: Fall and Summer)

MEEG 448H3. Honors Thermal Systems Analysis and Design. 3 Hours.
Analysis design and optimization of thermal systems and components with examples from such areas as power generation, refrigeration, and propulsion. Availability loss characteristics of energy systems and availability conservation methods. Additional topics, with an additional design project and /or more rigorous approach to design projects for honors course. Advanced project required. Prerequisite: MEEG 44103. (Typically offered: Fall and Summer)

MEEG 45003. Introduction to Flight. 3 Hours.
The course will provide understanding in basic aerodynamics, airfoil design and characteristics, and flight control surfaces. Prerequisite: MATH 25804, MEEG 35003. (Typically offered: Fall)

MEEG 450H3. Honors Introduction to Flight. 3 Hours.
The course will provide understanding in basic aerodynamics, airfoil design and characteristics, and flight control surfaces. Prerequisite: MATH 25804 and MEEG 35003. (Typically offered: Fall)

MEEG 45203. Astronautics. 3 Hours.
Study of spacecraft design and operations. Prerequisite: MEEG 20103 and MEEG 24003 or consent of instructor. (Typically offered: Irregular)

MEEG 46303. Additive Manufacturing. 3 Hours.
This course provides an overview of developing opportunities and critical challenges of additive manufacturing (AM, also known as 3-D printing). It covers existing and emerging additive manufacturing processes in the context of product design, materials selection and processing, and industrial and consumer applications. Students will learn to take advantage of the new capabilities of additive manufacturing technologies (e.g., design freedom) for existing and new applications and the implementation of their designs in a laboratory through project-based learning. Students may not receive credit for both MEEG 46303 and MEEG 56303. Prerequisite: MEEG 21031, MEEG 23003, MEEG 30103, and MEEG 35003 or instructor consent. (Typically offered: Spring)

MEEG 47003. Mathematical Methods in Engineering. 3 Hours.
Determinants, matrices, inverse of a matrix, simultaneous equations, eigenvalues, eigenvectors, coordinate transformations for matrices, diagonalization, square roots of a matrix, cryptography, and method of least squares. Vector algebra and calculus, Green's theorem, Strokes' theorem, and Gauss' divergence theorem. Index notation, epsilon-delta identity, and Cartesian tensors. Curvilinear coordinates, base vectors, and covariant and contravariant tensors. Applications to mechanics. Prerequisite: MATH 26004. (Typically offered: Irregular)

MEEG 490H3. Honors Mechanical Engineering Research. 3 Hours.
Independent research for mechanical engineering honors students. Prerequisite: Honors standing and instructor consent. (Typically offered: Fall and Spring)

MEEG 4910V. Special Topics in Mechanical Engineering. 1-6 Hour.
Consideration of current mechanical engineering topics not covered in other courses. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

MEEG 4920V. Individual Study in Mechanical Engineering. 1-3 Hour.
Individual study and research on a topic of mutually agreeable interest to the student and a faculty member. Prerequisite: Senior standing. (Typically offered: Fall, Spring and Summer)

MEEG 492HV. Honors Individual Study in Mechanical Engineering. 1-3 Hour.
Individual study and research on a topic of mutually agreeable interest to the student and a faculty member. Prerequisite: Senior standing. (Typically offered: Fall, Spring and Summer)
This course is equivalent to MEEG 4920V.