



Memo

To: Randy Smith, Vice Provost for Academic Programs

From: Rosie Quinzon-Bonello, Assistant Dean for Curriculum and Assessment

Date: May 13, 2024

Re: Informational Item – Technical Elective Revision to UG Aerospace Engineering Program

On May 13, 2024, The College of Engineering Committee for Academic Affairs approved the following revisions to the Aerospace Engineering B.Sc. program.

Current TE requirements	CCAA approved TE revisions
<p>Students</p> <ul style="list-style-type: none"> • must take at least six credit hours from the approved AEROENG course list • may count a maximum of three credit hours from the approved MECHENG, NUCLREN, and CIVILEN list • may take, with permission, any other 5000, 6000, or 7000 level AEROENG to fulfill degree requirements . 	<p>Students</p> <ul style="list-style-type: none"> • may take any 5000-level AEROENG, MECHENG, or NUCLREN course • are provided an expanded pre-approved list organized broadly by subject area (provided only as a guide) outside of MAE. • may take a maximum of six credit hour from the pre-approved list. • are limited to taking no more than three credit hours of ENGR courses from the pre-approved list.

These revisions

- do not change the total number of credit hours to fulfill the technical elective requirement.
- do not change the total number of credit hours required to complete the aerospace engineering degree program.

Attached is the proposal.

Please contact me if you require additional information.

Yours sincerely,

Rosie Quinzon-Bonello



MEMORANDUM

DATE: April 3, 2024

TO: Vice Provost W. Randy Smith, Council on Academic Affairs

FROM: Mrinal Kumar, Program Director, Aerospace Engineering

SUBJECT: Changes to the Aerospace Engineering Technical Electives Program

The Department of Mechanical and Aerospace Engineering is implementing improvements to the Aerospace Engineering undergraduate electives program. Modern aerospace engineering is increasingly cross-disciplinary and is emerging as an enabler for advancements in numerous fields of human endeavor, such as environmental and climate sciences, public health and policy, modern agriculture, food security, etc. We seek to provide more options to our undergraduate students in the selection of their technical electives so that they are better prepared to tackle grand challenges in these and other domains. The following improvements are planned:

The current [standard technical elective track](#) requires the completion of nine credit hours from a list of approved AEROENG, MECHENG, NUCLREN, and CIVILEN courses of which

- at least six credit hours must come from the approved AEROENG course list
- a maximum of three credit hours can come from the approved MECHENG, NUCLREN, and CIVILEN list
- with permission, any other 5000, 6000, or 7000 level AEROENG to fulfill degree requirements.

The department is proposing the following changes:

- **Proposed:** Any 5000-level AEROENG, MECHENG, or NUCLREN course
- **Proposed:** Allow students to enroll in a maximum of 6 credits hours from non-aerospace engineering courses.
- **Proposed:** Provide students an expanded pre-approved list, organized broadly by subject area, of courses from outside MAE that will count as an elective list. (See revised list attached to this document.
 - o There are no requirements to pick a minimum number of elective courses from within a subject area. The organization of courses as such is only to help students navigate the expanded list of elective choices.
- **Proposed:** ENGR courses are limited to a maximum of three credit hours.

Students will be informed to be aware of prerequisites requirements and that they may need to seek permission from the instructor.

The above-described expansion of the aerospace engineering technical electives program:

- **does not change the total number of credit hours** required to complete the aerospace engineering degree program.
- does not change the total number of credit hours to fulfill the technical elective requirement.
- does not change the maximum number of credit hours that students can double-count towards earning a minor degree.

We expect these changes to the Aerospace Engineering technical electives program to increase flexibility for our undergraduate students and allow them to gain a wider range of perspectives and skill sets. We will inform the program coordinators at each unit listed in the attachment so that they may make necessary preparations for increased enrollment.

These proposed changes have been reviewed and approved by the AE UGIC/Curriculum committee. We are requesting these changes become effective Autumn 2024 semester. All currently enrolled AE students will remain on the previous technical elective program; however, they will have the ability to petition the UGIC to take any of the courses from the new program to complete their technical elective hours.

Attachment: Preapproved course list with course titles.

Attachment 1. Preapproved List of Courses for the Aerospace Engineering Technical Electives Program

SUBJECT AREA	COURSE LIST
AEROSPACE ENGINEERING	ANY 5000-LEVEL COURSE
MECHANICAL ENGINEERING	ANY 5000-LEVEL COURSE
NUCLEAR ENGINEERING	ANY 5000-LEVEL COURSE
ARTIFICIAL INTELLIGENCE	CSE: 5052, 5521, 5526, 5539, 5546 STAT: 4620
ADVANCED MATERIAL AND SMART MANUFACTURING	MATSCEN: 5951 MECHENG: 5162, 5374 BME: 4310
AUTONOMY AND ADVANCED SENSING	AEROENG: 5621 ECE: 5013, 5200, 5460, 5551, 5553, 5555, 6001, 6750 CSE: 5524 CIVILEN: 6435, 6451
BIOENGINEERING	MECHENG: 5180 ECE 5206 BME: 4110, 4210, 4310, 4410, 5110, 5120
ENVIRONMENTAL SCIENCES AND CLIMATE CHANGE	ENR: 3335.01/02, 3800, 5310, 5560, 5340 ENVENG: 3200 4218, 5140 FABE: 3200S, 5310, 5330
CYBERSECURITY	ECE: 5555, 5561 CSE: 5471
GREEN AVIATION	CBE: 5713 BIOCHEM: 4511 AVN: 3900

HUMAN FACTORS	ISE: 5710
INFRASTRUCTURE DEVELOPMENT	CIVILEN: 5300, 5700, 5750
	AVN: 4100, 4400, 5300
MACHINE LEARNING	CSE: 5243, 5523, 5526, 5441, 5442, 5544
	ECE: 5307
	MECHENG: 5775
	ISE: 5745
	STAT: 4620
MATHEMATICS, STATISTICS	MATH: 4512, 4530, 4547, 4556
	STAT: 3460, 3470.01, 4201, 4620
MODERN AGRICULTURE, FOOD SECURITY	AGSYSMT: 4580, 5560, 5580
PROFESSIONAL SKILLS	ISE: 3800
	ENGR: 4375, 5680, 6230
	MECHENG: 5600
POLICY	PUBAFRS 3000, 3620, 5600 (CROSS LISTED /W ENVENG)
REMOTE SENSING	CIVILEN: 5400, 5420, 5441 5461, 6435, 6451
	AGSYSMT: 5560
SPACE TRAVEL	AEROENG: 5626, 5621, 5752, 5775
	NUCLREN: 5606
SOCIAL JUSTICE	ENGR: 4375
	ECE: 5050, 5550, 5570
	ENVENG: 4600

COURSE TITLES

DEPARTMENT/CENTER	COURSE NUMBER	COURSE TITLE
AEROSPACE ENGINEERING	ALL 5000-LEVEL COURSES	
BIOMEDICAL ENGINEERING	BIOMEDE 4110	Bioimaging
	BIOMEDE 4210	Biotransport
	BIOMEDE 4310	Biomaterials
	BIOMEDE 4410	Biomechanics
	BIOMEDE 5110	Biomedical Microscopic Imaging
	BIOMEDE 5120	Biomedical Optics
CENTER FOR AVIATION STUDIES	AVN 3900	Air Traffic Management Systems and Environment
	AVN 4100	Commercial Flight Fundamentals
	AVN 4400	Airport Management
	AVN 5300	Airport Planning, Design, and Development
CHEMICAL AND BIOMOLECULAR ENGINEERING	CBE 5713	Fuel Cells and Catalysis
CHEMISTRY	CHEM 4511	Biochemistry
CIVIL, ENVIRONMENTAL, AND GEODETIC ENGINEERING	CIVILEN 5300	Airport Planning, Design, and Development
	CIVILEN 5400	Introduction to Geographic Information Systems
	CIVILEN 5420	Remote Sensing of Environment
	CIVILEN 5441	Introduction to GPS: Theory and Applications
	CIVILEN 5461	Geospatial Numerical Analysis
	CIVILEN 5700	Urban Transportation Demand Forecasting
	CIVILEN 5750	Instrumentation, Signals, and Control in Transportation Applications
	CIVILEN 6435	Global Navigation Satellite Systems (GNSS) Data Processing
	CIVILEN 6451	Introduction to Photogrammetry
	ENVENG 3200	Fundamentals of Environmental Engineering
	ENVENG 4218	Measurement and Modeling of Climate Change
	ENVENG 4600	Assessment for Human Rights and Sustainability
	ENVENG 5140	Air Quality Engineering
	ENVENG 5600	Science, Engineering, and Public Policy

COMPUTER SCIENCE AND ENGINEERING	CSE 5052	Survey of Artificial Intelligence for Non-Majors
	CSE 5243	Introduction to Data Mining
	CSE 5441	Introduction to Parallel Computing
	CSE 5442	High-Performance Deep/Machine Learning
	CSE 5471	Introduction to Cybersecurity
	CSE 5521	Survey of Artificial Intelligence I: Basic Techniques
	CSE 5523	Machine Learning and Statistical Pattern Recognition
	CSE 5524	Computer Vision for Human-Computer Interaction
	CSE 5526	Introduction to Neural Networks
	CSE 5539	Intermediate Studies in Artificial Intelligence
	CSE 5544	Introduction to Data Visualization
	CSE 5546	Virtual Reality
ELECTRICAL AND COMPUTER ENGINEERING	ECE 5013	Introduction to Radar Systems
	ECE 5050	Humanitarian Engineering
	ECE 5200	Introduction to Digital Signal Processing
	ECE 5206	Medical Imaging and Processing
	ECE 5307	Introduction to Machine Learning for ECE
	ECE 5460	Image Processing
	ECE 5550	Feedback Control Engineering for Social Justice
	ECE 5551	State-Space Control Systems
	ECE 5553	Autonomy in Vehicles
	ECE 5555	Securing Autonomous Systems
	ECE 5561	Introduction to Cybersecurity
	ECE 5570	Antiracist Technology
	ECE 6001	Probability and Random Variables
	ECE 6750	Linear Systems Theory
ENGINEERING ADMINISTRATION	ENGR 4375	Inclusive Leadership Practice for Emerging Professionals
	ENGR 5680	Leading in Engineering Organizations
	ENGR 6230	Technology Strategy & Innovation for Engineers
FOOD, AGRICULTURAL AND BIOLOGICAL ENGINEERING	AGSYSMT 4580	Precision Agriculture
	AGSYSMT 5560	UAS and Remote Sensing in Agriculture
	AGSYSMT 5580	Data Analytics in Production Agriculture
	FABENG 3200S	Engineering for Community Development in Ohio
	FABENG 5310	Ecological Engineering and Science

	FABENG 5330	Environmental Biophysics
INTEGRATED SYSTEMS ENGINEERING	ISE 3800	Engineering Project Management
	ISE 5710	Behind Human Error: Safety and Complex Systems
	ISE 5745	Human-Centered Machine Learning
MATERIAL SCIENCE AND ENGINEERING	MATSCEN 5951	Corrosion
MATHEMATICS	MATH 4512	Partial Differential Equations for Science and Engineering
	MATH 4530	Probability
	MATH 4547	Introductory Analysis I
	MATH 4556	Dynamical Systems
MECHANICAL ENGINEERING	ALL 5000-LEVEL COURSES	
NUCLEAR ENGINEERING	ALL 5000-LEVEL COURSES	
PUBLIC AFFAIRS	PUBAFRS 3000	Introduction to Public Policy Analysis
	PUBAFRS 3620	US Space Policy and the Global Space Economy
	PUBAFRS 5600	Science, Engineering, and Public Policy
SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES	ENR 3335.01	Introduction to Wildland Fire Management
	ENR 3335.02	Wildland Fire Management Laboratory
	ENR 3800	Principles and Tools of Ecosystem Restoration
	ENR 5310	Ecological Engineering and Science
	ENR 5340	Forest Ecosystem Management
	ENR 5560	The Dynamics of Ecosystem Restoration
STATISTICS	STAT 3460	Principles of Statistics for Engineers
	STAT 3470	Introduction to Probability and Statistics for Engineers
	STAT 4201	Introduction to Mathematical Statistics I
	STAT 4620	Introduction to Statistical Learning