

SUBCOMMITTEE A – AGENDA

**Via Zoom**  
March 21, 2024  
1:30 p.m.

**PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES**

**COLLEGE OF ENGINEERING**

1. Request to establish a **Bachelor of Science** degree in **Technology Engineering** in the College of Engineering. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its February 8, 2024 meeting.

- a. **Background Information:**

The Bachelor of Science degree in Technology Engineering program was developed to fulfill the needs of industry workforce demands with an engineering graduate with a diverse skillset. The curriculum of the program offers options to students who may not meet the secondary admission requirements of other engineering programs due to GPA minimums but would be eligible for secondary admission to the Bachelor of Science degree in Technology Engineering. This offers an additional avenue for the retention of students within the College and the University.

The program will seek accreditation by ABET Engineering Accreditation Commission (EAC).

- b. **Academic Programs Catalog Text:**

The Bachelor of Science degree in Technology Engineering is an innovative program which prepares students for modern engineering challenges in the multidisciplinary, interconnected world. The degree is designed to develop engineering and technology foundational skills including, but not limited to, embedded electronic systems, computer aided design, product prototyping, data science, project management, and computer programming in Python and C++. Students will choose a concentration in Mechatronics or Embedded Cybersecurity, to further advance their engineering and technology interests. The program utilizes hands-on, real-world projects to integrate modern technologies with the engineering mindset.

**Requirements for the Bachelor of Science Degree in Technology Engineering**

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 128 credits, including general elective credits, are required for the Bachelor of Science degree in Technology Engineering.

The University's Tier II writing requirement for the Technology Engineering major is met by completing Technology Engineering 480. That course is referenced in item 3. b. below.

Students who are enrolled in the College of Engineering may complete the alternative track to Integrative Studies in Biological and Physical Sciences that is described in item 1. under the heading **Graduation Requirements for All Majors** in the College statement. Certain courses referenced in requirement 3. below may be used to satisfy the alternative track.

2. The requirements of the College of Engineering for the Bachelor of Science degree.

The credits earned in certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate.

3. The following requirements for the major:

			CREDITS
a.	All of the following courses (29 credits):		
	CEM 161	General Chemistry Laboratory I	1
	CSE 232	Introduction to Programming II	4
	ECE 230	Digital Logic Fundamentals	3
	ME 280	Graphic Communications	2
	MGT 325	Management Skills and Processes	3
	Or		
	SCM 304	Survey of Supply Chain Management	3

	MSE	250	Materials Science and Engineering	3
	PHY	251	Introductory Physics Laboratory I	1
	Or			
	PHY	191	Physics Laboratory for Scientists I	1
	PHY	252	Introductory Physics Laboratory II	1
	STT	180	Introduction to Data Science	4
	STT	201	Statistical Methods	4
			A basic math or science elective from a define course pool	3
b.			All of the following courses (25 credits):	
	TNG	210	Manufacturing Processes and Prototyping	2
	TNG	220	Electrical Circuits	4
	TNG	310	Advanced Graphics Communications	3
	TNG	320	Sensors and Signal Processing	3
	TNG	322	Electronics and Embedded Systems Lab	1
	TNG	330	Quality and Continuous Improvement	3
	TNG	335	Computer Security Fundamentals	3
	TNG	430	Engineering Project Management	3
	TNG	480	Technology Engineering Capstone (W)	3
c.			One of the following concentrations (16 credits):	
			<b><i>Mechatronics</i></b>	
	TNG	340	Engineering Statics and Mechanics of Materials	3
	TNG	345	Mechanical Machine Dynamics	3
	TNG	440	Robotics, Automation, and Controls	3
	TNG	445	Troubleshooting Mechatronic Systems	4
	TNG	447	Topics in Mechatronics	3
			<b><i>Embedded Cybersecurity</i></b>	
	TNG	350	Operating System Fundamentals	3
	TNG	355	Networks and Network Security	3
	TNG	450	Hardware Cybersecurity	3
	TNG	455	Engineering Secure Hardware and Software	4
	TNG	457	Topics in Embedded Cybersecurity	3
			The concentration will be noted on the student's academic record.	

Effective Fall 2024.

2. Request to change the **Admission to the College** statement in the **College of Engineering**. The University Committee on Undergraduate Education (UCUE) approved this request at its February 8, 2022 meeting.

- a. Under the heading **Admission to the College**, add the following new paragraph five:

Minimum criteria for admission to the Technology Engineering program:

1. Completion of at least 28 credits earned after matriculation to Michigan State University.
2. Completion of Mathematics 116 and 132 with a minimum grade of 2.0 in each course.
3. A minimum grade-point average of 2.0 in all mathematics courses.
4. Completion of Chemistry 141 or 151 or approved substitution or waiver.
5. Completion of Physics 183 or 231.
6. Completion of Engineering 102 or Computer Science 231.
7. Completion of Engineering 100.

Effective Fall 2024.

3. Request to change the **Graduation Requirements for All Majors** in the College of Engineering. The University Committee on Undergraduate Education (UCUE) approved this request at its February 8, 2024 meeting.

a. Under the heading **Graduation Requirements for All Majors** make the following changes:

(1) Add the following to item 1. b.:

Technology Engineering majors may use Physics 231 or 232.

(2) Add the following to item 1. c.:

Technology Engineering majors may use Physics 251.

(3) Change the first sentence of item 2. to the following:

The requirements of the College of Engineering for the Bachelor of Science degree in all majors other than Technology Engineering that are listed below:

(4) Change item 2. a. to the following:

Mathematics 132, 133, 234, and 235. Computational Data Science and Computer Science majors are not required to complete Mathematics 235.

(5) Add the following item 3.:

3. The requirements of the College of Engineering for the Bachelor of Science degree in Technology Engineering that are listed below:

- a. Mathematics 116 and 132.
- b. Chemistry 141 or 151.
- c. Physics 183 or 183B or 231 and 184 or 184B or 232.
- d. Engineering 100.
- e. Engineering 102.
- f. Computer Science and Engineering 231.

Effective Fall 2024.

4. Request to change the requirements in the **Bachelor of Science** degree in **Mechanical Engineering** in the Department of Mechanical Engineering.

*The concentrations in the Bachelor of Science degree in Mechanical Engineering are noted on the student's academic record when the requirements for the degree have been completed.*

a. Under the heading **Requirements for the Bachelor of Science Degree in Mechanical Engineering** make the following changes:

(1) In item 3. b. delete the following courses:

ME	332	Fluid Mechanics	4
ME	451	Control Systems	4

Add the following courses:

ME	333	Fluid Mechanics	3
ME	333L	Fluid Mechanics Laboratory	1
ME	452	Control Systems	3
ME	452L	Vibrations and Controls Laboratory	1

(2) Under the heading **Computational Design** concentration replace the requirements with the following:

To earn a Bachelor of Science degree in Mechanical Engineering with a computational design concentration, students must the requirements for the B.S. degree, including the following:

All of the following courses (9 credits):

ME	416	Computer Assisted Design of Thermal Systems	3
ME	433	Introduction to Computational Fluid Dynamics	3
ME	475	Computer Aided Design of Structures	3

One of the following courses (3 credits):

ME	417	Design of Alternative Energy Systems	3
ME	445	Automotive Powertrain Design	3
ME	456	Mechatronic System Design	3
ME	465	Computer Aided Optimal Design	3

- (3) Delete the **Concentration in Global Engineering**.

*Students currently enrolled in the major have until US28 to complete the requirements for this concentration and have it noted on the student's academic record.*

Effective Fall 2024.

### LYMAN BRIGGS COLLEGE

1. Request to recognize the **Integrated Science-Secondary Education** major leading to the Bachelor of Science degree in the College of Natural Science as a **Coordinate Major in Lyman Briggs College**.

Effective Fall 2024.

## **PART II - NEW COURSES AND CHANGES**

### **COLLEGE OF ENGINEERING**

TNG 210	Manufacturing Processes and Prototyping Fall of every year. Spring of every year. 2(0-4) P: EGR 100 and (ME 280 or concurrently) R: Open to sophomores in the College of Engineering. Approval of department.
NEW	This course will expose students to both large and small scale conventional and additive manufacturing processes as well as electronics and chip manufacturing. Laboratory provides hands-on experiences with machine shop tools selection, use, and safe operation. Effective Fall Semester 2024
TNG 220	Electrical Circuits Fall of every year. Spring of every year. 4(3-2) P: PHY 232 and PHY 252 and MTH 132 R: Open to sophomores in the College of Engineering. Approval of department. Not open to students with credit in ECE 201.
NEW	Applications and theory of circuits and circuit design including common standard electrical components. Laboratory provides hands-on study of both AC and DC circuits. Effective Fall Semester 2024
TNG 310	Advanced Graphic Communications Fall of every year. Spring of every year. 3(1-4) P: TNG 210 and ME 280 R: Open to sophomores in the College of Engineering. Approval of department. Not open to students with credit in ME 385.
NEW	Continuation of Graphic Communications including electrical schematics, geometric design and tolerancing, electrical and mechanical system design, and the integration of computer aided design, computer aided manufacturing, and computer numerical control. Effective Fall Semester 2024
TNG 320	Sensors and Signal Processing Fall of every year. Spring of every year. 3(2-2) P: TNG 220 and STT 180 R: Open to juniors in the College of Engineering. Approval of department. Not open to students with credit in ECE 366.
NEW	Conceptualizing of real-world phenomena in terms of electrical output and the implementation of devices for transduction and measurement. Topics include transducer selection, signal characteristics, signal conditioning, signaling protocol design choices, interfacing with software, and debugging such systems. Effective Fall Semester 2024
TNG 322	Electronics and Embedded Systems Lab Fall of every year. Spring of every year. 1(0-2) P: ECE 230 and TNG 320 R: Open to juniors in the College of Engineering.
NEW	Topics include assembly language, instruction sets, addressing modes, stack management, embedded architecture design choices, digital and analog interfaces, and embedded system applications. Students will develop an understanding of basic communication protocols utilized between device components and between device and host. Emphasis is placed on the practical application of knowledge, where students will employ common software tools to design, troubleshoot, and debug systems. Effective Fall Semester 2024
TNG 330	Quality and Continuous Improvement Fall of every year. Spring of every year. 3(3-0) P: STT 201 and TNG 310 R: Open to juniors in the College of Engineering. Approval of department.
NEW	Methods of quality control and improvement that are used in the manufacturing and service industries are covered. Topics include quality philosophy and fundamentals, statistical methods of quality improvement, concept of variation and its reduction, control charts, and Statistical Process Control (SPC). Effective Fall Semester 2024

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TNG 335	Computer Security Fundamentals Fall of every year. Spring of every year. 3(3-0) P: CSE 231 R: Open to juniors or seniors in the College of Engineering. Approval of department.
NEW	Topics in computer security are explored including data security, system security, and societal, ethical implications. Effective Fall Semester 2024
TNG 340	Engineering Statics and Mechanics of Materials Fall of every year. 3(2-2) P: {(MTH 132) and PHY 231} or PHY 183 R: Open to juniors in the College of Engineering. Approval of department. Not open to students with credit in CE 221 or ME 222.
NEW	Force systems, resultants, equilibrium, trusses, frames, beams, and shear-moments in beams are studied. Additionally, concepts of stress, strain, and deformation resulting from the various applied load configurations, will be studied. Effective Fall Semester 2024
TNG 345	Mechanical Machine Dynamics Spring of every year. 3(2-2) P: TNG 340 R: Open to juniors in the College of Engineering. Approval of department. Not open to students with credit in ME 361.
NEW	This course deals with discussion and application of the kinematics and kinetics of mechanical machines. Topics include mechanical machine design including linkages, followers, gears, and drive systems in linear, planar, and 3D motion. The subsequent kinetics of the systems will be explored. Effective Fall Semester 2024
TNG 350	Operating System Fundamentals Fall of every year. 3(2-2) P: CSE 232 R: Open to juniors in the College of Engineering.
NEW	This course introduces foundational concepts underpinning modern operating systems. Topics include memory management, process management and prioritization, and input/output abstractions (files, sockets, etc). Emphasis is placed on both theoretical understanding and practical application, allowing students to implement core components of an operating system. Effective Fall Semester 2024
TNG 355	Networks and Network Security Spring of every year. 3(2-2) P: CSE 232 R: Open to juniors in the College of Engineering.
NEW	Networking principles with an emphasis on IP and communication protocols will be studied. Students will gain an understanding of the layered architecture of networks and the functions of each layer. A focus on security will show common network attack vectors and how technologies defend against such attacks. Effective Fall Semester 2024
TNG 430	Engineering Project Management Fall of every year. Spring of every year. 3(3-0) P: TNG 330 or concurrently R: Open to juniors in the College of Engineering. Approval of department.
NEW	This course covers the basics of managing an engineering project, including scope, schedule, budget, and communications. Students will explore how design considerations such as public health and safety, engineering standards, customer diversity, and ethical responsibilities affect the project outcome. Engineering economics will be covered. Effective Fall Semester 2024
TNG 440	Robotics, Automation, and Controls Fall of every year. 3(2-2) P: TNG 320 and (TNG 322 or concurrently) and TNG 345 R: Open to juniors or seniors in the College of Engineering. Approval of department.
NEW	Various hardware, software, sensors, and human resources required to implement effective control systems will be studied. Students will be engaged in hands-on laboratory exercises requiring them to configure systems, write programs, analyze data, and report on performance. Focus on interfacing and controlling a variety of electromechanical devices such as motors and pneumatic actuators. Industrial safety practices and procedures are emphasized throughout the course. Effective Fall Semester 2024

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TNG 445	Troubleshooting Mechatronic Systems Spring of every year. 4(2-4) P: TNG 440 R: Open to juniors or seniors in the College of Engineering. Approval of department.
NEW	This course examines the concepts, devices, and common practices associated with modern industrial control systems. Emphasis is on testing the output performance of the control system and troubleshooting techniques to address common issues. Effective Fall Semester 2024
TNG 447	Topics in Mechatronics Fall of every year. 3(3-0) P: TNG 440 or concurrently
NEW	This course explores current topics in mechatronics through case studies, product analysis, and exploration of state-of-the-art industry applications. Effective Fall Semester 2024
TNG 450	Hardware Cybersecurity Fall of every year. 3(2-2) P: TNG 322 and TNG 350 R: Open to juniors in the College of Engineering.
NEW	This course explores the reverse engineering process and how to methodically learn about a system from the ground up. This includes techniques for observing system components, measuring internal traces, and dumping important system resources. Students will see how these techniques can be defended against. Effective Fall Semester 2024
TNG 455	Engineering Secure Hardware and Software Spring of every year. 4(2-4) P: TNG 355 and TNG 450
NEW	Students are tasked with conceptualizing and executing projects, centered on the design of a resilient system, defining the attack surface area, and fortifying against potential attacks. Students will perform forensic analyses of hardware and software systems. Effective Fall Semester 2024
TNG 457	Topics in Embedded Cybersecurity Fall of every year. 3(3-0) P: TNG 450 or concurrently
NEW	This course explores current topics in embedded cybersecurity through case studies, product analysis, and exploration of state-of-the-art industry applications. Studies of found vulnerabilities of the last decade, their disclosure, how they affected the hardware/software ecosystem, and how they could have been prevented will be discussed. Effective Fall Semester 2024
TNG 480	Technology Engineering Capstone (W) Fall of every year. Spring of every year. 3(1-4) P: TNG 430 R: Open to seniors in the College of Engineering. Approval of department.
NEW	Planning and execution of a team project involving the development of an engineered product or system, utilizing knowledge and skills acquired in prior engineering coursework. Project considerations include engineering standards, system constraints, design for customer needs, ethical issues, budget, timing, and safety. Effective Fall Semester 2024
ME 333	Fluid Mechanics Fall of every year. Spring of every year. 3(3-0) P: (ME 361) and (CHE 321 or ME 201) and ((ME 391 or concurrently) and completion of Tier I writing requirement) R: Open to juniors or seniors in the Mechanical Engineering Major. Not open to students with credit in ME 332. C: ME 333L concurrently
NEW	Statics, control volume equations, similitude, and exact fluid solutions. Turbulence, pipe flow, boundary layer flow, compressible flow, and Navier-Stokes equations. Effective Fall Semester 2024

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ME 333L	Fluid Mechanics Laboratory
	Fall of every year. Spring of every year. 1(0-3) R: Open to juniors or seniors in the Mechanical Engineering Major. C: ME 333 concurrently
NEW	Practices and measurement techniques for fluid mechanics including; measurement uncertainty, flow visualization, pressure, streamlines, conservation, laminar flow, and turbulent flow. Effective Fall Semester 2024
ME 410	Heat Transfer
	Fall of every year. Spring of every year. 3(3-0) P: (ME 332 or CE 321 or CHE 311) and ME 394 P: {(ME 332 or CE 321 or CHE 311) or (ME 333 and ME 333L)} and ME 391 R: Open to juniors or seniors in the Mechanical Engineering Major.
	Steady state and transient heat conduction. Natural and forced convection based on boundary layer theory. Application of Nusselt number correlations. Radiant heat transfer principles and applications including radiation networks. Effective Fall Semester 2024
ME 452	Control Systems
	Fall of every year. Spring of every year. 3(3-0) P: ME 461 and ECE 345 R: Open to juniors or seniors in the Mechanical Engineering Major. Not open to students with credit in ME 451. C: ME 452L concurrently
NEW	Mathematical modeling of dynamic systems. Standard feedback control formulation. Transient and sinusoidal steady state analysis. Time and frequency domain controller synthesis. Effective Fall Semester 2024
ME 452L	Vibrations and Controls Laboratory
	Fall of every year. Spring of every year. 1(0-3) R: Open to juniors or seniors in the Mechanical Engineering Major. Not open to students with credit in ME 451. C: ME 452 concurrently
NEW	Modeling, measuring, and analysis of oscillatory phenomena found in linear discrete and continuous mechanical systems. Mathematical modeling of dynamic systems. Standard feedback control formulation. Transient and sinusoidal steady state analysis. Time and frequency domain controller synthesis. Effective Fall Semester 2024

### COLLEGE OF HUMAN MEDICINE

PH 837	Poverty and Public Health
	<del>Fall of even years.</del> Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: PH 801 RB: <del>Academic or professional background in public health or public health related discipline. Undergraduate level math or statistics course work.</del> RB: Academic or professional background in public health and/or public health related discipline R: Open to students in the Public Health Major or approval of college.
	<del>Concepts of health and poverty and their interrelatedness from a global and public health perspective. Roles of international agencies, national policy, gender, socioeconomic status, race, ethnicity, culture, access to resources, and conflict. Role of public health programs in the achievement and maintenance of healthy populations. Struggle to eliminate poverty. In-depth examination of intersection of poverty and public health from a US and global perspective. Role of social inequities, structural factors and forms of oppression that generate poverty. Possible policy, advocacy, and other public health solutions to help eliminate poverty.</del>
	SA: HM 837 Effective Spring Semester 2024



**COLLEGE OF NATURAL SCIENCE**

ISE 801	Laboratory Investigations in Secondary Education Fall of every year. 4(1-6) R: Open to master's students in the College of Natural Science or in the Center for Integrative Studies in General Science . Approval of department.
NEW	Exploration of the 3-dimensions of NGSS through laboratory investigations. Effective Fall Semester 2024
ISE 821	Integrated Science Research and Engineering Spring of every year. 3(2-2) R: Open to master's students. Approval of department.
NEW	Exploration of the NGSS Science and Engineering Practices through novel research and engineering design projects. Effective Fall Semester 2024
ISE 822	Foundational Earth Systems for Secondary Science Education Spring of every year. 4(3-2) R: Open to master's students. Approval of department.
NEW	Laboratory based exploration and implementation of 3D learning related to natural, physical, and chemical processes in the Universe, the planets and the Earth. Effective Spring Semester 2025