

Submit on blue paper

COURSE / CURRICULUM MODIFICATION REQUESTCOLLEGE **Technology******COURSE CHANGE**

- ☐ Create new course
☐ Eliminate course
☐ Modify existing course (mark all that apply):
 ☐ Title ☐ Description ☐ Prerequisite
 ☐ Course content
 ☐ Course number (old course number to be deleted)
 ☐ Credit Hours ☐ Term offered
 ☐ Contact Hours
 ☐ Method of instruction (see table on reverse)
 ☐ Web-centric
 ☐ Web-based (definitions on reverse)

Requested Course change effective date: _____ (Semester/Year)

Implemented by Registrar, effective:

reviewed by Undergraduate Council if it has broad impactPROGRAM CHANGE****Program Name:** **Mechanical and Manufacturing Engineering**

- ☐ Minor change to program requirements/checksheet
☐ Change program name
☒ *Create new program and new program code (check one):
 ☒ degree ☒ major ☐ minor
 ☐ specialization ☐ certificate
☐ *Major change to program requirements/checksheet
☐ *Program to be available 100% online
☐ *Add, delete, modify program matriculation requirements
☐ *Suspend admission to and/or eliminate a program

Requested Program effective date: **Fall 2023** (Semester/Year)

Implemented by Registrar, effective:

*reviewed by Undergraduate CouncilCATALOG DESCRIPTION for a new or modified course, OR BRIEF OVERVIEW of program change (limit 675 characters):

As part of an upcoming restructuring, the College of Technology, Architecture, and Applied Engineering has been approved to develop a School of Engineering that supports the university's strategic plan, FORWARD. The College currently houses one undergraduate engineering program, Systems Engineering, and is working to transition existing engineering technology programs into engineering programs. The proposed change is to transition the current B.S in Mechanical and Manufacturing Engineering Technology program into a B.S. in Mechanical and Manufacturing Engineering. The transition from engineering technology to engineering requires changes that include renaming the program, updating course content, adding new courses, renaming courses, and adapting existing program learning outcomes to meet standards established by the Engineering Accreditation Commission (EAC) of ABET.


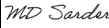
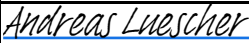
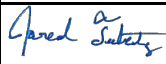
(If this is a new course or if the "Method of instruction" box is checked above):

Maximum Class Size _____ Grading method: ☐ A/F ☐ S/U only ☐ A/B/C/NC (No Credit) ☐ S/NC (No Credit)

Method(s) of Instruction* _____ and contact hours _____

*See page two for Methods of Instruction definitions and approved combinations

What other colleges or departments/programs may be affected by this proposal? **College of Arts and Sciences, College of Business****Please attach comments from affected units and circulate them with the curriculum modification request.

	Position	Name (print or type)	Signature	Date
1	Proposer Tel: 419- 3725436 Position: Assistant Teaching Professor	Mikhail Shilov	 Mikhail Shilov (May 10, 2022 16:46 EDT)	
ADEQUATE LIBRARY MATERIALS ARE AVAILABLE (For NEW COURSE or NEW PROGRAM only):				
2	Dean, University Libraries	Sara Bushong		
APPROVED:				
3	Chair or School/Program Director	MD Sarder		
4	Chair, College/School Curriculum Committee	Andreas Luescher	 Andreas Luescher (May 24, 2022 09:05 EDT)	
5	Dean of College	Jennie Gallimore		
6	Secretary, UGC (major changes only)	Sarah Meussling		
ACTIONS OF UNDERGRADUATE COUNCIL ARE REVIEWED BY THE FACULTY SENATE COMMITTEE ON ACADEMIC AFFAIRS (CAA).			Materials sent to CAA on:	
7	Provost/VPAA	Glenn Davis		
REVIEWED AND IMPLEMENTED BY:				
8	Registrar	Becky Cogswell		

SUBMITTING CURRICULUM MODIFICATION REQUESTS

A complete curriculum modification request includes a cover (blue) sheet and responses to either the “Course Change Request Form” or the “Program Change Request Form,” as appropriate (<http://www.bgsu.edu/provost/undergraduate-education/curriculum-modification-blue-sheets.html>).

The type of change will determine the way the proposal will be routed for approval. Changes that have minimal impact on other programs or on student requirements do not require review by the Undergraduate Council. For instance, “Minor changes to program requirements/checksheet” are those, such as small changes to the list of courses required for a major that have little or no effect on other academic units or on students’ likely academic progress. Please NOTE: The creation of a new course is a “Course Change,” but the addition of a course to program requirements is a “Program Change” requiring a separate blue sheet – neither change requires review by Undergraduate Council.

Any change that has a substantial impact on programs or students will require Undergraduate Council approval. For instance, “Major changes to program requirements/checksheet” are those that involve extensive new patterns of requirements for existing majors and minors (including entrance requirements from pre-major programs), or that have a significant impact on other departments’ programs / student requirements. Similarly, if a course change has wide impact on students in other programs, it will be reviewed by Undergraduate Council. Proposals for new degrees should be prepared in consultation with the office of the Provost/VPAA; they require approval by the Board of Trustees and the Ohio Department of Higher Education (formerly known as the Ohio Board of Regents). The Department of Higher Education new program/degree guidelines are available in the office of the Provost/VPAA. Program changes that include contractual arrangements with other institutions must be reviewed by University Counsel prior to signing. They also require Provost/VPAA approval and may require approval by the Board of Trustees.

CATALOG DESCRIPTION for a new or modified course, OR BRIEF OVERVIEW of other change:

1. **For requests to introduce or modify a course**, type the new description of the course (limit, 675 characters) exactly as it should appear in the Undergraduate Catalog, including course number, title, credit hours, semesters offered, description, and prerequisites. Indicate contact hours per week associated with primary methods of instruction (e.g., **LE(2)**, **LB(3)**) – see table for brief definitions and approved combinations), class size, and grading method.
2. **For all other requests**, provide an identifying title for the proposal and a succinct description of the proposed change.

CHECKPOINT PROCEDURES

1. All proposals are circulated to the college offices for review (see #3, below). Anticipating that review, the person initiating the proposal should identify any academic units that may have a specific interest in the proposal. During review, the college offices are expected to attach comments from the identified units (and other units, as appropriate). The proposer may speed the process by soliciting comments prior to review by the colleges.
2. The Dean of University Libraries must certify that adequate library materials are available for any new course or new program. This may be a time-consuming step, so the proposer is encouraged to begin work with the library while the proposal is in draft form. Following library review and approval by the department chair or school/program director the proposal is forwarded to the dean for transmittal to the college curriculum committee.
3. Following review and approval by the curriculum committee and the Dean, the original and any supplemental statements should be submitted to the Office of the Provost/VPAA. All proposals will be circulated to the other colleges by the Secretary of Undergraduate Council. If no objection is raised within 14 days, proposals not requiring review by Undergraduate Council will be transmitted to the Provost/VPAA for approval. All other proposals will be forwarded to Undergraduate Council.

Methods of Instruction (defined by OBR)

Contact the BGSU Registrar for full descriptions.

LE	Lecture	DI	Discussion
SE	Seminar	RE	Recitation
LB	Lab	CL	Clinical
PR	Practicum	FE	Field Experience
ST	Studio	IS	Individual Studies
TU	Tutorial	SP	Self-Paced
OT	Other		

Web-centric: Course requires at least one class meeting, but web materials will be used to substitute for at least half of the regularly scheduled class meetings. Extensive use of the web will be required.

Web-based: 100% online course – students do not meet in a traditional classroom setting.

Approved Combinations

LE/LB	Lecture/ Lab	SE/FE	Seminar/ Field Experience
DI/RE	Discussion/ Recitation	TU/SP	Tutorial/ Self-Paced
LE/RE	Lecture/ Recitation	LE/LB	Lecture/Lab/ /RE Recitation
LE/RE/PR	Lecture/Recitation/Practicum		

Modifications to courses cross-listed as graduate courses should be processed simultaneously through the Graduate College.

PROGRAM CHANGE REQUEST FORM

This sheet is an overview of the content and format of proposals for a new undergraduate program, or for elimination or modification of an existing program. Most program changes must be reviewed by Undergraduate Council and, in some cases, by the Board of Trustees and/or the Ohio Board of Regents. As a result, a proposal for program changes should generally be prepared in consultation with the Office of the Senior Vice President for Academic Affairs and Provost. Some of the information in the proposal must be summarized on the COURSE/CURRICULUM MODIFICATION REQUEST cover sheet ("blue sheet") that will accompany it through the approval process. *Depending on the nature of the request, it may not be necessary to provide all the information below. Please use your own responses to the checkbox items on the "blue sheet" as a guide for deciding which items below are relevant to your proposal.* Please use the outline headings shown below to prepare your document; omit any that do not apply.

A. THE MODIFICATION

1. *For all proposals:* Describe briefly the nature of the proposed change.

As part of an upcoming restructuring, the College of Technology, Architecture, and Applied Engineering has been approved to develop a School of Engineering that supports the university's strategic plan, FORWARD. The College currently houses one undergraduate engineering program, Systems Engineering, and is working to transition existing engineering technology programs into engineering programs. The proposed change is to transition the current B.S in Mechanical and Manufacturing Engineering Technology program into a B.S. in Mechanical and Manufacturing Engineering. The transition from engineering technology to engineering requires changes that include renaming the program, updating course content, adding new courses, renaming courses, and adapting existing program learning outcomes to meet standards established by the Engineering Accreditation Commission (EAC) of ABET

The curriculum modification process is intended to change program requirements as represented in the Undergraduate Catalog and on checksheets. For this reason, all curriculum modifications for new programs or program revisions must include:

- 1.1 A checksheet that shows and highlights the proposed change(s). (Please make the *changes* on the checksheet *obvious*, preferable with revision markings).
- 1.2 Catalog pages (printed from the current version of the online catalog) showing the proposed changes. (Please use revision markings or some other device to make *changes obvious*). If a new program is being proposed, then new catalog copy should be submitted. Care should be taken to ensure that the proposed changes to the catalog match the proposed changes to the checksheet.
2. List courses to be taken out of program requirements. (If courses are to be eliminated from course inventory, submit a separate "course change" for that action).
Not applicable. New program.
3. List courses to be added to program requirements. (If new courses are to be added to course inventory, submit a separate "course change" for that action).
See the check sheet for the list of courses that will be in the program.
4. *For proposals to make major changes to program requirements:* Describe any change to the sequence of courses within a major/minor/area of specialization/certificate.
Sequence of courses is provided in the attached Degree Plan.
5. Will this change result in modification of student learning outcomes? ☒ yes ☐ no

If yes, list all changes to the student learning outcomes related to the curriculum modification and describe the plan for assessing those outcomes.

See attached for the assessment plan. This program is intended to be accredited by ABET,

and the following are expected ABET student outcomes:

- 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.**
- 2. an ability to 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.**
- 3. an ability to communicate effectively with a range of audiences.**
- 4. an ability to 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.**
- 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.**
- 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.**
- 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.**

6. Program changes approved before the January deadline for the Catalog update will be recorded in the Catalog and will be in effect for checksheets in the fall of that year.

B. RATIONALE [Required for all proposals]:

1. Reason/Need for the change. For new programs, explain how this fits with the Academic Plan.

This is a transtion from Mechanical & Manufacturing Engineering Technolgoy to Mechanical and Manufacturing Engineering. This supports the University's Strategic Plan FORWARD to impact the regional, stte, and national needs of engineers to support product development, manufacturing, and logistics. This also supports/aligns our programs to the newly approved College structure with the creation of the School of Engnieering.

2. Student implications (describe the basis for each estimate)

- 2.1 Prospective demand for a new degree/major/minor (level of student interest).

Marketing analysis results are provided as an attachment.

- 2.2 Effect on required hours in degree/major/minor.

Minimum number of credit hours to complete is 122.

- 2.3 Number of students affected and in what way.

No existing students will be affected.

- 2.4 Effect on elective hours of majors/minors.

Not applicable.

- 2.5 If a degree/major/minor is to be eliminated, how will current students in the program be accommodated?

Not applicable.

- 2.6 If requirements for matriculation from a pre-major program are to be added or modified, how will those changes affect student enrollment and progress toward graduation?

No matriculation requirements will be used.

- 2.7 Is this a degree program whose normal time to degree is something other than four calendar years for a baccalaureate degree and two calendar years for an associate degree? If so, how many hours/years to obtain the degree?
Degree can be completed in four years, see the graduation plan attached.

C. IMPLICATIONS FOR EXISTING PROGRAMS *[For all proposals]:*

1. How will the proposed change affect the integrity of other programs to which it is related, including the demand for courses or degrees in other programs

1.1 in the department/school?

It is anticipated that the originating technology degree program, BS-MMET, enrollment will decrease and may be phased out as the demand and enrollment in this engineering program increases.

1.2 in the college?

Course enrollments will shift from current technology courses to those of engineering courses as new programs roll out

1.3 in other university departments/colleges?

- **Demand for some MATH and Science courses may increase as may other required/optional courses – communication has occurred and documented.**

1.4 at other universities?

2. What individuals in other departments/schools/colleges, if any, have been consulted about this proposal? *[attach correspondence where appropriate]*

**See the email communication with the following departments and/or programs:
COMM CHEM ENG and WRIT MATH PHYS ECON MGMT SYE TECH ROBO ECE**

3. What effect will the proposed change have on accreditation of this program or of associated programs in the college/university?

The program is designed to meet requirements of ABET for both Mechanical and Manufacturing subjects. As soon as the program has a graduate, application for ABET accreditation is planned to be submitted.

4. What effect will the proposed change have on the ability of the department/school/college/university to meet goals for recruitment, retention, and diversity?

- **The enrollment in this engineering degree program is anticipated to be higher than the present technology degree program allowing for recruitment of more students.**

D. STAFFING IMPLICATIONS/QUALIFICATIONS

1. *For new programs, or if an existing degree/major/minor/area of specialization is to be modified:*
Are faculty and staff with expertise available now? ☒ yes ☐ no
If not, how will they be identified/recruited?

2. *For all proposals:* How will this change affect the allocation of faculty and staff in the department/school/college? **No changes.**
3. *For all proposals:* How will this change affect faculty work load? **No changes.**

E. AVAILABILITY OF RESOURCES

1. *For all proposals:* Indicate any unique space requirements for new or modified curricula, and space likely to be released by the elimination or modification of existing curricula, and space likely to be released by the elimination or modification of existing curricula.
No changes.
2. *For all proposals:* Indicate any new one-time or continuing costs for materials, equipment, services, or personnel directly associated with a new or modified curriculum. How will these costs be covered? Indicate any cost savings to be generated if an existing degree/major/minor/area of specialization is to be eliminated.
Not applicable.
3. *For all programs, or if an existing degree/major/minor/area of specialization to be modified:* Indicate any unique library, computer, or instructional media resources that will be needed for new or modified curricula. Are they already available?
IEEE Journal access needed.
Software needs are already in place through ITS/BGSU (e.g., MATLAB, simulation software)

F. TIMETABLE FOR IMPLEMENTATION [*For all proposals*]

1. Provide a detailed timetable for events that will occur as the proposed program change is accomplished (e.g. addition or elimination of courses, hiring of faculty).
Pending overall approval implementation will be intentional to allow for recent students to enter transitioned program should they choose and then have new students enter as they initially enroll at BGSU. Students in existing engineering technology program will be supported fully to complete in progress degree program

G. OTHER INFORMATION

1. Provide other information that may be helpful in the review process, as appropriate.
See attached packet that includes:
 - check sheet,
 - degree plan,
 - blue sheets for courses with major changes,
 - EZ blue sheets for courses with minor changes,
 - support e-mails,
 - learning outcomes and the assessment plan.

Mechanical and Manufacturing Engineering Technology

BG PERSPECTIVE (BGP) REQUIREMENTS:

Course _____ Credits _____
Must complete at least 1 course in each of the following:
 English Composition and Oral Communication

_____ _____
 Quantitative Literacy

_____ _____
Must complete at least 2 courses in each of the following:
 Humanities and the Arts

_____ _____
 Natural Sciences - at least one Lab Science required

_____ _____
 Social and Behavioral Sciences

_____ _____
**Complete total required BGP credit hours by selecting
 courses from any of the above categories:**

UNIVERSITY REQUIREMENTS

Note: Designated courses in the Humanities and the Arts, and the Social and Behavioral Sciences domains may be used to fulfill both a BGP requirement and one of the following university requirements:

Cultural Diversity in the U.S. _____
 International Perspective _____

Composition Requirement:
 _____ WRIT 1120 Research Writing _____

Total BGP Credits: Must be at least 36

Matriculation courses are shown in **bold print**.

** These courses may be used to meet BG Perspective requirements, but hours are counted only once.

*** Consider taking courses from technical areas (for example, ENGT, QS, ECET, ROBO, CS, etc.). TECH 4890 can be used as an elective. Non-technical electives may be used upon advisement.

QS courses are offered online only.

See Undergraduate Catalog

Courses Required for Major

Cooperative Education **2 Hrs**
 _____ **TECH 2890 Co-op** **1**
 _____ **TECH 3890 Co-op** **1**

Engineering Technology Core **60 Hrs**
 _____ **ECET 1960 Electrical-Electronics Sys** **3**
 _____ ECET 3100 Programmable Logic Controllers **3**
 _____ **ENGT 1100 Computer Aided Design** **3**
 _____ ENGT 2100 Solid Modeling **3**
 _____ **ENGT 2200 Manufacturing Processes** **3**
 _____ ENGT 2250 Machine Design **3**
 _____ ENGT 2300 Fluid Power Transmission **3**
 _____ ENGT 2400 Statics **3**
 _____ ENGT 2450 Strength of Materials **3**
 _____ ENGT 2480 Dynamics **3**
 _____ ENGT 3200 CAM & Rapid Prototyping **3**
 _____ ENGT 3400 Props & Test. of Eng. Materials **3**
 _____ ENGT 3480 Thermodynamics **3**
 _____ ENGT 3500 Metrology and GD&T **3**
 _____ ENGT 4000 Adv Modeling, Sim & Analysis **3**
 _____ ENGT 4250 Manufacturing Design & Operations **3**
 _____ ENGT 4500 Senior Capstone Project **3**
 _____ QS 3550 Foundations of Lean **3**
 _____ QS 3850 Core Tools of Quality Systems **3**
 _____ ROBO 2080 Industrial Robotics **3**

Technical Electives*** **10-12 Hrs**
 _____ Electives by Advisement **10-12**

Other Required Courses

University **32-33 Hrs**
 _____ ENG 3880 **3**
 _____ TECH 3020** **3**
 _____ TECH 4400 **3**
 _____ **MATH 1280** or Equiv** **5**
 _____ MATH 1310** or 1340**+1350 **5-6**
 _____ **PHYS 2010** or 2110**** **5**
 _____ PHYS 2020** or 2120** **5**
 _____ COMM 1020** **3**

Business **9 Hrs**
 _____ **STAT 2000** or higher** **3**
 _____ ECON 2000 ** or 2020** **3**
 _____ MGMT 3050 **3**

Total Minimum Program Hours **122**

Important information on the back.

Mechanical and Manufacturing Engineering

<p>BG PERSPECTIVE (BGP) Requirements: Course Credits Must complete at least 1 course in each of the following: English Composition and Oral Communication _____ _____ Quantitative Literacy _____ _____ Must complete at least 2 courses in each of the following: Humanities and the Arts _____ _____ _____ Natural Sciences - at least one Lab Science required _____ _____ _____ Social and Behavioral Sciences _____ _____ _____ Complete total required BGP credit hours by selecting courses from any of the above categories: _____ _____ UNIVERSITY REQUIREMENTS Note: Designated courses in the Humanities and the Arts, and the Social and Behavioral Sciences domains may be used to fulfill both a BGP requirement and one of the following university requirements: Cultural Diversity in the U.S.: _____ International Perspective: _____ Composition Requirement: _____ <i>Total BGP Credits: Must be at least 36</i> ** These courses may be used to meet BG Perspective requirements, but hours are counted only once.</p>	<table> <tr> <td>Courses Required for Major</td> <td></td> </tr> <tr> <td>Cooperative Education</td> <td>2</td> </tr> <tr> <td>_____ TECH 2890 Co-op</td> <td>1</td> </tr> <tr> <td>_____ TECH 3890 Co-op</td> <td>1</td> </tr> <tr> <td>General Engineering Courses</td> <td>24</td> </tr> <tr> <td>_____ MME 1100 Computer Aided Design</td> <td>3</td> </tr> <tr> <td>_____ MME 2400 Statics</td> <td>3</td> </tr> <tr> <td>_____ MME 2480 Dynamics</td> <td>3</td> </tr> <tr> <td>_____ MME 2800 Fluid Mechanics</td> <td>3</td> </tr> <tr> <td>_____ MME 3150 Strength of materials</td> <td>3</td> </tr> <tr> <td>_____ MME 3480 Thermodynamics</td> <td>3</td> </tr> <tr> <td>_____ MME 4100 Heat Transfer</td> <td>3</td> </tr> <tr> <td>_____ ECE 1965 Intro to Electronics and Computer+</td> <td>3</td> </tr> <tr> <td>Mechanical and Manufacturing Courses</td> <td>39</td> </tr> <tr> <td>_____ MME 1700 Engineering Design and Skills</td> <td>3</td> </tr> <tr> <td>_____ MME 2150 Engineering Materials</td> <td>3</td> </tr> <tr> <td>_____ MME 2500 Metrology and GD&T</td> <td>3</td> </tr> <tr> <td>_____ MME 2700 Manufacturing Processes</td> <td>3</td> </tr> <tr> <td>_____ MME 3200 CAM & Additive Manufacturing</td> <td>3</td> </tr> <tr> <td>_____ MME 3350 Machine Design</td> <td>3</td> </tr> <tr> <td>_____ MME 4000 Advanced Sim & Analysis</td> <td>3</td> </tr> <tr> <td>_____ MME 4250 Manufacturing Design & Operations</td> <td>3</td> </tr> <tr> <td>_____ MME 4400 Advanced Manufacturing</td> <td>3</td> </tr> <tr> <td>_____ MME 4500 Senior Capstone Project</td> <td>3</td> </tr> <tr> <td>_____ QS 3550 Foundations of Lean</td> <td>3</td> </tr> <tr> <td>_____ ROBO 2080 Industrial Robotics and Automation</td> <td>3</td> </tr> <tr> <td>_____ SYE 3030 Production and Material Handling</td> <td>3</td> </tr> <tr> <td>Systems</td> <td></td> </tr> <tr> <td>Non-Engineering Required Courses</td> <td>42</td> </tr> <tr> <td>_____ COMM 1020** - Intro to Public Speaking</td> <td>3</td> </tr> <tr> <td>_____ CHEM 1090 AND CHEM 1100 Elem. Chemistry + Lab</td> <td>4</td> </tr> <tr> <td>_____ ENG 3880 – Intro to Technical Writing</td> <td>3</td> </tr> <tr> <td>_____ TECH 3020 – Technology Systems in Societies</td> <td>3</td> </tr> <tr> <td>_____ MATH 1310** or 1340** + 1350</td> <td>5</td> </tr> <tr> <td>_____ MATH 2320 – Calculus and Analytical Geometry II</td> <td>5</td> </tr> <tr> <td>_____ MATH 2910 – Applied Engineering Mathematics</td> <td>3</td> </tr> <tr> <td>_____ PHYS 2110** - University Physics I</td> <td>5</td> </tr> <tr> <td>_____ PHYS 2120** - University Physics II</td> <td>5</td> </tr> <tr> <td>_____ MATH 2470 – Fundamentals of Statistics</td> <td>3</td> </tr> <tr> <td>_____ ECON 2000** or 2020**</td> <td>3</td> </tr> <tr> <td>Technical electives (select any two)</td> <td>6</td> </tr> <tr> <td>_____ MME 3100 Numerical Methods</td> <td></td> </tr> <tr> <td>_____ ECE 3105 Programmable Logic Controllers</td> <td></td> </tr> <tr> <td>_____ SYE 2010 or higher</td> <td></td> </tr> <tr> <td>_____ ROBO 3133 Microfab and Semiconductor Process</td> <td></td> </tr> <tr> <td>_____ TECH 4400 Project Management in Tech Settings</td> <td></td> </tr> <tr> <td>_____ CS 2010 Programming Fundamentals</td> <td></td> </tr> <tr> <td>_____ QS 3610 or higher</td> <td></td> </tr> <tr> <td>_____ MGMT 3050 Principles of Org. and Management</td> <td></td> </tr> <tr> <td>_____ Or by advisement</td> <td></td> </tr> <tr> <td>Total Minimum Program Hours</td> <td>122</td> </tr> </table>	Courses Required for Major		Cooperative Education	2	_____ TECH 2890 Co-op	1	_____ TECH 3890 Co-op	1	General Engineering Courses	24	_____ MME 1100 Computer Aided Design	3	_____ MME 2400 Statics	3	_____ MME 2480 Dynamics	3	_____ MME 2800 Fluid Mechanics	3	_____ MME 3150 Strength of materials	3	_____ MME 3480 Thermodynamics	3	_____ MME 4100 Heat Transfer	3	_____ ECE 1965 Intro to Electronics and Computer+	3	Mechanical and Manufacturing Courses	39	_____ MME 1700 Engineering Design and Skills	3	_____ MME 2150 Engineering Materials	3	_____ MME 2500 Metrology and GD&T	3	_____ MME 2700 Manufacturing Processes	3	_____ MME 3200 CAM & Additive Manufacturing	3	_____ MME 3350 Machine Design	3	_____ MME 4000 Advanced Sim & Analysis	3	_____ MME 4250 Manufacturing Design & Operations	3	_____ MME 4400 Advanced Manufacturing	3	_____ MME 4500 Senior Capstone Project	3	_____ QS 3550 Foundations of Lean	3	_____ ROBO 2080 Industrial Robotics and Automation	3	_____ SYE 3030 Production and Material Handling	3	Systems		Non-Engineering Required Courses	42	_____ COMM 1020** - Intro to Public Speaking	3	_____ CHEM 1090 AND CHEM 1100 Elem. 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_____ MME 4100 Heat Transfer	3																																																																																																						
_____ ECE 1965 Intro to Electronics and Computer+	3																																																																																																						
Mechanical and Manufacturing Courses	39																																																																																																						
_____ MME 1700 Engineering Design and Skills	3																																																																																																						
_____ MME 2150 Engineering Materials	3																																																																																																						
_____ MME 2500 Metrology and GD&T	3																																																																																																						
_____ MME 2700 Manufacturing Processes	3																																																																																																						
_____ MME 3200 CAM & Additive Manufacturing	3																																																																																																						
_____ MME 3350 Machine Design	3																																																																																																						
_____ MME 4000 Advanced Sim & Analysis	3																																																																																																						
_____ MME 4250 Manufacturing Design & Operations	3																																																																																																						
_____ MME 4400 Advanced Manufacturing	3																																																																																																						
_____ MME 4500 Senior Capstone Project	3																																																																																																						
_____ QS 3550 Foundations of Lean	3																																																																																																						
_____ ROBO 2080 Industrial Robotics and Automation	3																																																																																																						
_____ SYE 3030 Production and Material Handling	3																																																																																																						
Systems																																																																																																							
Non-Engineering Required Courses	42																																																																																																						
_____ COMM 1020** - Intro to Public Speaking	3																																																																																																						
_____ CHEM 1090 AND CHEM 1100 Elem. Chemistry + Lab	4																																																																																																						
_____ ENG 3880 – Intro to Technical Writing	3																																																																																																						
_____ TECH 3020 – Technology Systems in Societies	3																																																																																																						
_____ MATH 1310** or 1340** + 1350	5																																																																																																						
_____ MATH 2320 – Calculus and Analytical Geometry II	5																																																																																																						
_____ MATH 2910 – Applied Engineering Mathematics	3																																																																																																						
_____ PHYS 2110** - University Physics I	5																																																																																																						
_____ PHYS 2120** - University Physics II	5																																																																																																						
_____ MATH 2470 – Fundamentals of Statistics	3																																																																																																						
_____ ECON 2000** or 2020**	3																																																																																																						
Technical electives (select any two)	6																																																																																																						
_____ MME 3100 Numerical Methods																																																																																																							
_____ ECE 3105 Programmable Logic Controllers																																																																																																							
_____ SYE 2010 or higher																																																																																																							
_____ ROBO 3133 Microfab and Semiconductor Process																																																																																																							
_____ TECH 4400 Project Management in Tech Settings																																																																																																							
_____ CS 2010 Programming Fundamentals																																																																																																							
_____ QS 3610 or higher																																																																																																							
_____ MGMT 3050 Principles of Org. and Management																																																																																																							
_____ Or by advisement																																																																																																							
Total Minimum Program Hours	122																																																																																																						

Mechanical and Manufacturing Engineering

College of Technology, Architecture and Applied Engineering **General Information for all students in the College**

In addition to completing all requirements on the checklist, students are responsible for:

Co-op

All students in the College are required to complete 2 or 3 co-ops, depending on your major. **THIS IS A COURSE.** It carries credit and is graded. It is full time (40 hrs/week) for the entire semester or part-time (20 hrs/week) for two consecutive semesters, paid and must be directly related to your major. All students **MUST** complete the Co-op Orientation available in Canvas.

Email

Official University email accounts are required for all BGSU students. Official BGSU email addresses are in the form: BGSUusername@bgsu.edu. At the time of admission or initial registration, all students will receive a bgsu.edu email account. Students may anticipate that official University correspondence will be sent to this email account and they should access BGSU email on a regular and timely basis. All correspondence from Undergraduate Student Services will be sent to your BGSU email.

Checksheet

The checklist should be used in conjunction with the degree audit and advising to track progress toward degree completion.

Sample Four Year Degree Plan
BS in Mechanical and Manufacturing Engineering – Fall 2023 Requirements
This is not an official graduation plan but a tool to use along with your audit and check sheet
Assuming placement in: MATH 1310 and WRIT 1120

Year 1 - Fall Semester BGSU 1910 <i>fall only</i> 1 MME 1100 <i>fall</i> 3 MATH 1310 5 PHYS 2110 5 WRIT 1120 3 Total hrs. 17	Year 1 – Spring Semester COMM 1020 3 MME 1700 3 MATH 2320 5 PHYS 2120 5 Total hrs. 16	Year 1 – Summer Session TECH 2890 1 Total hrs. 1
Year 2 - Fall Semester ECE 1965 <i>fall</i> 3 MME 2400 <i>fall only</i> 3 MME 2150 <i>fall only</i> 3 MATH 2910 3 CHEM 1090+1100 4 Total hrs. 16	Year 2 – Spring Semester MME 2480 <i>spring only</i> 3 MME 2500 <i>spring only</i> 3 ROBO 2080 <i>spring only</i> 3 MATH 2470 <i>fall & spring</i> 3 ECON 2000 3 Total hrs. 15	Year 2 – Summer Session TECH 3890 1 Total hrs. 1
Year 3 - Fall Semester MME 2800 <i>fall only</i> 3 MME 3150 <i>fall only</i> 3 MME 2700 <i>fall only</i> 3 BGP H&A 3 QS 3550 <i>fall and summer</i> 3 Total hrs. 15	Year 3 – Spring Semester ENG 3880 <i>fall spring summer</i> 3 MME 3350 <i>spring only</i> 3 MME 3480 <i>spring only</i> 3 MME 3200 <i>spring only</i> 3 SYE 3030 3 Total hrs. 15	Year 3 – Summer Session
Year 4 - Fall Semester MME 4000 <i>fall</i> 3 MME 4250 <i>fall only</i> 3 Technical Elective 1 <i>fall & spring</i> 3 Technical Elective 2 <i>fall & spring</i> 3 TECH 3020 <i>fall & spring</i> 3 Total hrs. 15	Year 4 – Spring Semester MME 4100 <i>spring only</i> 3 MME 4500 3 MME 4400 3 BGP H&A + Cult. Div. 3 Total hrs. 12	Year 4 – Summer Session

Mechanical and Manufacturing Engineering program outcomes and assessment plan:

No	Outcome	Classes used for assessment
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	MME 2400 MME 3480
2	An ability to 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.	MME 3350 MME 4250
3	An ability to communicate effectively with a range of audiences	MME 1700 MME 4500
4	An ability to 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.	MME 1700 MME 4250 MME 4500
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	MME 3350 MME 4500
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	MME 2150 MME 4250
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	MME 4000

Re: New Engineering program - adding courses

John R Cable <cable@bgsu.edu>

Tue 3/29/2022 4:19 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Hello Mikhail,

I have no concerns with your requiring CHEM 1090/1100 in your new program's checksheet.

Best regards,

John

John Cable, Chair
Department of Chemistry
Bowling Green State University

On Mar 29, 2022, at 12:50 PM, Mikhail Shilov <mshilov@bgsu.edu> wrote:

Hello Dr. Cable,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to **hopefully obtain your support** as we are planning to have the following courses in the check sheet as required courses:

- CHEM 1090 - Elementary Chemistry AND
- CHEM 1100 - Elementary Chemistry Laboratory

The anticipated number of students is hard to predict but will be between 10-20 students per year. We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding courses

Laura Stafford <llstaff@bgsu.edu>

Tue 3/29/2022 2:30 PM

To: Mikhail Shilov <mshilov@bgsu.edu>; Marcus Landon Sherrell <mlsherr@bgsu.edu>

We would support this.

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Tuesday, March 29, 2022 12:45 PM

To: Marcus Landon Sherrell <mlsherr@bgsu.edu>

Cc: Laura Stafford <llstaff@bgsu.edu>

Subject: New Engineering program - adding courses

Hello Dr. Sherrell,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to **hopefully obtain your support** as we are planning to have the following course in the check sheet as a required course:

- COMM 1020 - Introduction to Public Speaking

The anticipated number of students is hard to predict but will be between 10-20 students per year. We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

Re: New Engineering program - adding a course

Sri R Kolla <skolla@bgsu.edu>

Tue 4/26/2022 3:55 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Cc: Sri R Kolla <skolla@bgsu.edu>

Thanks for the information. I am fine with adding ECE 1965 as required course to MME checksheet. I am ok with adding ECE 3105 to MME checksheet, however I would have preferred if this course is also a required course, similar to the MMET checksheet. Regards.

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Monday, April 25, 2022 11:36 AM

To: Sri R Kolla <skolla@bgsu.edu>

Subject: New Engineering program - adding a course

Hello Dr. Kolla,

As you know, we are proposing a new program in Engineering. The new program is Mechanical and Manufacturing Engineering.

As per procedure, I would like to hopefully obtain your support as we are planning to have the following course in the check sheet as a required course and also include options for electives courses:

Required: ECE 1965 - Intro to Electronics and Computer

Under Technical electives, it will state "ECE 3105" among other elective courses from various disciplines.

We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding courses

Peter G Vanderhart <pvander@bgsu.edu>

Tue 3/29/2022 1:38 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Mikhail,

Yes, I approve of including those 2 courses as options. Note that both qualify as BGP courses.

Do you need more than this email?

Pete

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Tuesday, March 29, 2022 12:34 PM

To: Peter G Vanderhart <pvander@bgsu.edu>

Subject: New Engineering program - adding courses

Hello Dr. VanderHart,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to hopefully obtain your support as we are planning to have one of the following courses in the check sheet as a required course (students will be allowed to select one or the other):

- ECON 2000 - Introduction to Economics **OR**
- ECON 2020 - Principles of Microeconomics.

The anticipated number of students is hard to predict but will be between 10-20 students per year. We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding courses

Tiffany Beth Scarola <tscarol@bgsu.edu>

Thu 4/7/2022 2:58 PM

To: Mikhail Shilov <mshilov@bgsu.edu>; Stephannie S Gearhart <stephsg@bgsu.edu>

Cc: Jennifer K Warnke <jkwarnke@bgsu.edu>; Danielle Marie Burkin <dburkin@bgsu.edu>

Mikhail,

After consulting with our program director for STC, she and I feel as though we could accommodate those students into our 3880 sections after you make the course a requirement for your majors.

She and I are very excited for this partnership.

Let me know if you have questions.

Tiffany

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Tuesday, April 5, 2022 9:33 AM

To: Tiffany Beth Scarola <tscarol@bgsu.edu>; Stephannie S Gearhart <stephsg@bgsu.edu>

Subject: Re: New Engineering program - adding courses

Tiffany,

That would be fine, thank you!

Mikhail

From: Tiffany Beth Scarola <tscarol@bgsu.edu>

Sent: Monday, April 4, 2022 9:58 AM

To: Stephannie S Gearhart <stephsg@bgsu.edu>; Mikhail Shilov <mshilov@bgsu.edu>

Subject: RE: New Engineering program - adding courses

Mikhail,

I am so glad to hear that you would like to add our courses to your major. I am getting in touch with our STC program director and a few other people to see if this is something we can endorse. Since our STC courses are a requirement for a lot of majors, I want to make sure we are able to have enough courses to offer and enough seats for those students.

Can I get back to you by the end of the week to let you know our answer?

I hope to hear from you soon.

Tiffany

From: Stephannie S Gearhart <stephsg@bgsu.edu>

Sent: Thursday, March 31, 2022 3:57 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Cc: Tiffany Beth Scarola <tscarol@bgsu.edu>

Subject: Re: New Engineering program - adding courses

Good catch, Mikhail! Thank you! And, I apologize.

Tiffany is now on the email. Thanks again, Tiffany, for looking into Mikhail's request.

Best,
Stephannie

Dr. Stephannie S. Gearhart (she/her/hers)
Professor and Acting Chair
Department of English
324/213 East Hall
Bowling Green State University
Bowling Green, Ohio 43403
419 372 6841/7540
stephsg@bgsu.edu
Zoom Office: <https://bgsu-edu.zoom.us/my/stephanniesg>

From: Mikhail Shilov <mshilov@bgsu.edu>
Sent: Wednesday, March 30, 2022 7:07 PM
To: Stephannie S Gearhart <stephsg@bgsu.edu>
Subject: Re: New Engineering program - adding courses

Dr. Gearhart,

Thank you for a quick response! Just to clarify, you mentioned that Tiffany Scarola is copied, but I don't see the email in the "cc" field. You might have sent a separate email, but I just wanted to make sure it reached the appropriate addressee.

Thank you again and have a great day,
Mikhail

From: Stephannie S Gearhart <stephsg@bgsu.edu>
Sent: Wednesday, March 30, 2022 11:42 AM
To: Mikhail Shilov <mshilov@bgsu.edu>
Subject: Re: New Engineering program - adding courses

Hello, Mikhail. Thanks for reaching out regarding your plan and its relationship to our courses in English. I'm copying our Associate Chair, Tiffany Scarola, here, as she heads our Undergrad Committee and knows the ins and outs of course enrollments. She can weigh in here on if/how your plan affects our offerings so your program can move forward ASAP.

Thanks, in advance, Tiffany. And, please let me know if you need my help on this one.

Best wishes, Mikhail, as you work on your new curriculum, and please don't hesitate to let us know how else we can help you out,
Stephannie

Dr. Stephannie S. Gearhart (she/her/hers)
Professor and Acting Chair
Department of English
324/213 East Hall
Bowling Green State University
Bowling Green, Ohio 43403
419 372 6841/7540
stephsg@bgsu.edu

Zoom Office: <https://bgsu-edu.zoom.us/my/stephanniesg>

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Tuesday, March 29, 2022 12:25 PM

To: Stephannie S Gearhart <stephsg@bgsu.edu>

Subject: New Engineering program - adding courses

Hello Dr. Gearhart,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to hopefully obtain your support as we are planning to have both of the following courses in the check sheet as required courses:

- WRIT 1120 - Seminar in Research Writing
- ENG 3880 - Introductory Technical Writing.

The anticipated number of students is hard to predict but will be between 10-20 students per year. We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

Re: New Engineering program - adding courses

Mikhail Shilov <mshilov@bgsu.edu>

Tue 3/29/2022 4:56 PM

To: Junfeng Shang <jshang@bgsu.edu>

Cc: Amber Snyder <amber@bgsu.edu>; Tong Sun <tsun@bgsu.edu>

Junfeng,

Thank you so much for a quick response and support!

You are correct, I overlooked and didn't include "OR 1340 + 1350" although it is in the check sheet. My understanding is that you would not oppose to this alternative. Just to clarify, in the check sheet it will appear as "MATH 1310 OR 1340+1350".

I will also make sure to communicate with colleagues and the Chair about MATH 2910 so that we inform you ahead of time. I assume the timing of when we need this course would depend on how fast the approval process goes through the University system and when we finally get new students.

Thank you again and have a good day,
Mikhail

From: Junfeng Shang <jshang@bgsu.edu>

Sent: Tuesday, March 29, 2022 3:20 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Cc: Amber Snyder <amber@bgsu.edu>; Tong Sun <tsun@bgsu.edu>

Subject: Re: New Engineering program - adding courses

Hi Mikhail,

The department would support the change of Math course requirements in **the program of Mechanical and Manufacturing Engineering**

A clarification for Math 1310 may be needed. You want to require Math 1310 only or Math 1310 or Math 1340 and 1350? You may want both in the requirements?

For Math 2910, this course is specifically designed for Engineering students. So, please inform our department ahead of time (number of students and which semester) so that our department can create the course for your students in a correct time. For this course, I hope you can have a meeting with our faculty about which textbook your side hopes to use for Math 2910.

Anyway, I hope we can coordinate well between the departments so we can open math courses for your students without any difficulty in arranging process.

Thanks,
Junfeng

Junfeng Shang

Professor and Chair
458 MSC | 419-372-7453
jshang@bgsu.edu

From: Mikhail Shilov <mshilov@bgsu.edu>
Sent: Tuesday, March 29, 2022 1:59 PM
To: Junfeng Shang <jshang@bgsu.edu>
Subject: New Engineering program - adding courses

Hello Dr. Shang,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to **hopefully obtain your support** as we are planning to have the following courses in the check sheet as required courses:

- MATH 1310 - Calculus and Analytic Geometry
- MATH 2320 - Calculus and Analytic Geometry II
- MATH 2470 - Fundamentals of Statistics
- MATH 2910 - Applied Engineering Mathematics with Applications

The anticipated number of students is hard to predict but will be between 10-20 students per year with a possibility of growth. We are proposing this change to take effect in the fall of 2023.

NOTE: It is understood that the pre-requisites for MATH 1310 will remain the same, and if a student is not prepared to take MATH 1310 right away, they will be required to complete MATH 1280 or even earlier courses. We have the same system in the existing MMET program where the check sheet only includes 1280, but if students are not at that level, they take 1220 or even earlier courses that are not on the MMET check sheet.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding courses

William J Sawaya <wsawaya@bgsu.edu>

Tue 3/29/2022 2:05 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

We are happy to support the inclusion of MGMT 3050 in the required core curriculum of Mechanical and Manufacturing Engineering.

William Sawaya, Ph.D.

Associate Professor

Chair, Department of Management

Allen W. and Carol M. Schmidthorst College of Business

241D Maurer Center

BGSU, Bowling Green State University

Bowling Green, OH 43403

wsawaya@bgsu.edu

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From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Tuesday, March 29, 2022 1:47 PM

To: William J Sawaya <wsawaya@bgsu.edu>

Subject: Re: New Engineering program - adding courses

Hello Dr. Sawaya,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to **hopefully obtain your support** as we are planning to have the following course in the check sheet as a required course:

- MGMT 3050 - Principles of Organization and Management

The anticipated number of students is hard to predict but will be between 10-20 students per year with possible growth. We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,

Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

From: Amy Lynn Sheldrick <asheldr@bgsu.edu>
Sent: Tuesday, March 29, 2022 1:43 PM
To: Mikhail Shilov <mshilov@bgsu.edu>
Cc: William J Sawaya <wsawaya@bgsu.edu>
Subject: RE: New Engineering program - adding courses

Hi Mikhail

I've copied Dr. Sawaya, our department chair, on this email. Feel free to reach out to him with any questions.

Amy

Amy Sheldrick
Administrative Assistant
Department of Management
Allen W. and Carol M. Schmidthorst College of Business
241L Maurer Center
Bowling Green State University
Bowling Green, OH 43403
BGSU

asheldr@bgsu.edu
Zoom personal room link: <https://bgsu-edu.zoom.us/my/amysheldrickzoom>
419-372-6963

From: Mikhail Shilov
Sent: Tuesday, March 29, 2022 1:40 PM
To: Amy Lynn Sheldrick <asheldr@bgsu.edu>
Subject: New Engineering program - adding courses

Hello Ms. Sheldrick,

I am making some curriculum changes in one of the programs in the College of Technology, Architecture, and Applied Engineering.

Could you please let me know who would be the best person to contact regarding including the following course in the curriculum: MGMT 3050 - Principles of Organization and Management?

Thank you in advance!
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436

mshilov@bgsu.edu

Re: New Engineering program - adding courses

Andrew Layden <laydena@bgsu.edu>

Wed 3/30/2022 9:15 AM

To: Mikhail Shilov <mshilov@bgsu.edu>

Dear Mikhail,

The Physics and Astronomy Department is excited about supporting the proposed new programs in Engineering.

We can support the new Mechanical and Manufacturing Engineering program at the level of 10-20 students, as proposed for Fall 2023. The proposed checksheet changes will increase the enrollments in our PHYS 2110 and 2120 University Physics courses by 25-100%, a significant but manageable change. Thanks for including the MATH prerequisites for these classes as part of your checksheet changes.

If there is a corresponding drop in PHYS 2010/2020 enrollments (students enroll in engineering instead of the existing engineering technology programs) we can reallocate existing resources (TA lab sections and recitation sections). However, if there is a net enrollment increase, we will require investment in these positions.

In particular, if the other Engineering programs that are being proposed are successful, we may need a significant investment in TA and faculty resources. We note that this will require coordination across the colleges at the Dean and/or Provost level. Clearly, this will be an ongoing conversation.

Meanwhile, we give our strong support to your proposal.

Best wishes,
-Andy Layden

Chair, Dept. of Physics & Astronomy
104C Overman Hall
Bowling Green State University
419-372-8653 || [Webpage](#)
[he/him/his]

From: Mikhail Shilov <mshilov@bgsu.edu>
Sent: Tuesday, March 29, 2022 1:15 PM
To: Andrew Layden <laydena@bgsu.edu>
Subject: New Engineering program - adding courses

Hello Dr. Layden,

My name is Mikhail Shilov, and I am proposing a new engineering program in the College of Technology, Architecture, and Applied Engineering.

The new program is **Mechanical and Manufacturing Engineering**. It is mostly based on the existing engineering technology program with a similar name.

As per procedure, I would like to **hopefully obtain your support** as we are planning to have both of the following courses in the check sheet as required courses:

- PHYS 2110 - University Physics I
- PHYS 2120 - University Physics II

The anticipated number of students is hard to predict but will be between 10-20 students per year with possible growth. We are proposing this change to take effect in the fall of 2023.

We also incorporated corresponding MATH courses into the curriculum and the graduation plan, so that these courses are taken simultaneously with PHYS courses.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding a course

Mohammad A Mayyas <mmayyas@bgsu.edu>

Mon 4/25/2022 11:53 AM

To: Mikhail Shilov <mshilov@bgsu.edu>

Mikhail,

I don't think you need a support as we were involved in the development. And I am supporting your curriculum changes below.

Best Regards

Mohammad

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Monday, April 25, 2022 11:29 AM

To: Mohammad A Mayyas <mmayyas@bgsu.edu>

Subject: New Engineering program - adding a course

Hello Dr. Mayyas,

As you know, we are proposing a new program in Engineering. The new program is Mechanical and Manufacturing Engineering.

As per procedure, I would like to obtain your support as we are planning to have the following course in the check sheet as a required course and also include options for elective courses:

Required: ROBO 2080 - Industrial Robotics and Automation

Under Technical electives, it will state "ROBO 3133" among other elective courses from various disciplines.

We are proposing this change to take effect in the fall of 2023.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu

RE: New Engineering program - adding courses

MD Baniamin Sarder <msarder@bgsu.edu>

Mon 4/25/2022 4:10 PM

To: Mikhail Shilov <mshilov@bgsu.edu>

Hi Mikhail,

I am fine with the proposed changes.

Best Regards,

MD

From: Mikhail Shilov <mshilov@bgsu.edu>

Sent: Monday, April 25, 2022 11:45 AM

To: MD Baniamin Sarder <msarder@bgsu.edu>

Subject: New Engineering program - adding courses

Hello Dr. Sarder,

As per procedure, I would like to obtain your support as we are planning to have the following courses in the Mechanical and Manufacturing Engineering check sheet as required courses and also include options for elective courses:

Required: - SYE 3030 - Production and Material Handling Systems

- TECH 3020 - Technology Systems in Societies

Under Technical electives, it will list "SYE 2010 or higher" and "TECH 4400" among other elective courses from various disciplines.

Please let me know if you would support this change or if you see any concerns regarding this proposal.

Thank you and have a great day,
Mikhail

Mikhail Shilov
Assistant Teaching Professor
Mechanical and Manufacturing Engineering Technology
Bowling Green State University
419-372-5436
mshilov@bgsu.edu



An evaluation of employer demand for graduates from the proposed bachelor's-level mechanical and manufacturing engineering program in both regional and national markets and student demand for similar programs.

Analysis Includes:

- Job Posting Trends
- Top Titles
- Top Skills
- Top Employers
- Top Industries
- Top Cities
- Experience Levels
- Education Levels
- Degree Completion Trends

The analysis considered demand in:

- Regional (i.e., Indiana, Michigan, Ohio, Pennsylvania)
- National (i.e., United States)

Options for Next Steps

Following this analysis, the requesting partner can:

- Choose to discontinue the research, if the leadership is able to make a decision based on this analysis and other institutional research.
- Continue the analysis. A final report of the continued research will address credential design and curricular recommendations.

Strong Employer Demand, Increasing Student Demand, and Equitable Competitive Market Suggest Favorable Program Potential

Preliminary Program Outlook

In both regions, growing employer demand is favorable for program graduates. Between August 2019 and July 2022, the average monthly employer demand growth for bachelor's-level mechanical and manufacturing engineering professionals outpaced that of bachelor's-level professionals overall in both markets (i.e., 1.71% vs. 1.32% regionally and 1.73% vs. 1.29% nationally). The high number of relevant job postings for both markets in the past year (i.e., 111,436 and 794,478 postings, respectively) suggests strong employment opportunities for program graduates. Further, four of the five top relevant occupations for both markets is projected to grow faster than average across the next 10 years which signals a growing labor market. Overall, these trends suggest plentiful job opportunities for program graduates.

Growing student demand outpaced growth in competition, indicating potential space for a new program. Regional and national reported degree completions for relevant programs increased an average 5.52% and 6.39% annually, respectively, between the 2015-2016 and 2019-2020 academic years. In the same period, the number of institutions reporting relevant completions increased an average 4.94% and 3.24%, respectively. Student demand outpacing institutional growth indicates a promising outlook for program launch.

An equitably distributed market in both regions signal a favorable competitive landscape. Between the 2015-2016 and 2019-2020 academic years, of the top 10 institutions reporting relevant completions, nine experienced a growth in completions regionally and 10 experienced a growth in completions nationally, indicating strong student demand. Additionally, no institution held more than 8.73% regional market share and 1.54% national market share in the 2019-2020 academic year, indicating an evenly distributed market. Overall, these trends suggest potential space for a new program.

Research Limitations

Additional bachelor's-level mechanical and manufacturing engineering programs may exist in the profiled geographic regions but are not captured in this analysis as institutions may report completions under other, less relevant, CIP codes.

Regional Analysis of Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals

Regional employer demand trends suggest a strong need for bachelor's-level mechanical and manufacturing engineering program graduates. Relevant employer demand grew an average 1.71% per month from August 2019 to July 2022, outpacing employer demand growth for all bachelor's-level professionals (i.e., an average 1.32% growth per month). Employers posted a high number of relevant job postings in the last 12 months (i.e., 111,436). These trends suggest a growing labor market with ample employment opportunities for program graduates.

+1.71%

Average Monthly Demand Growth

August 2019 to July 2022, Regional Data

- Average monthly growth of 300 job postings.
- During the same period, demand for all bachelor's-level professionals grew 1.32%.

17,811 job postings

Average Monthly Demand

August 2019 to July 2022, Regional Data

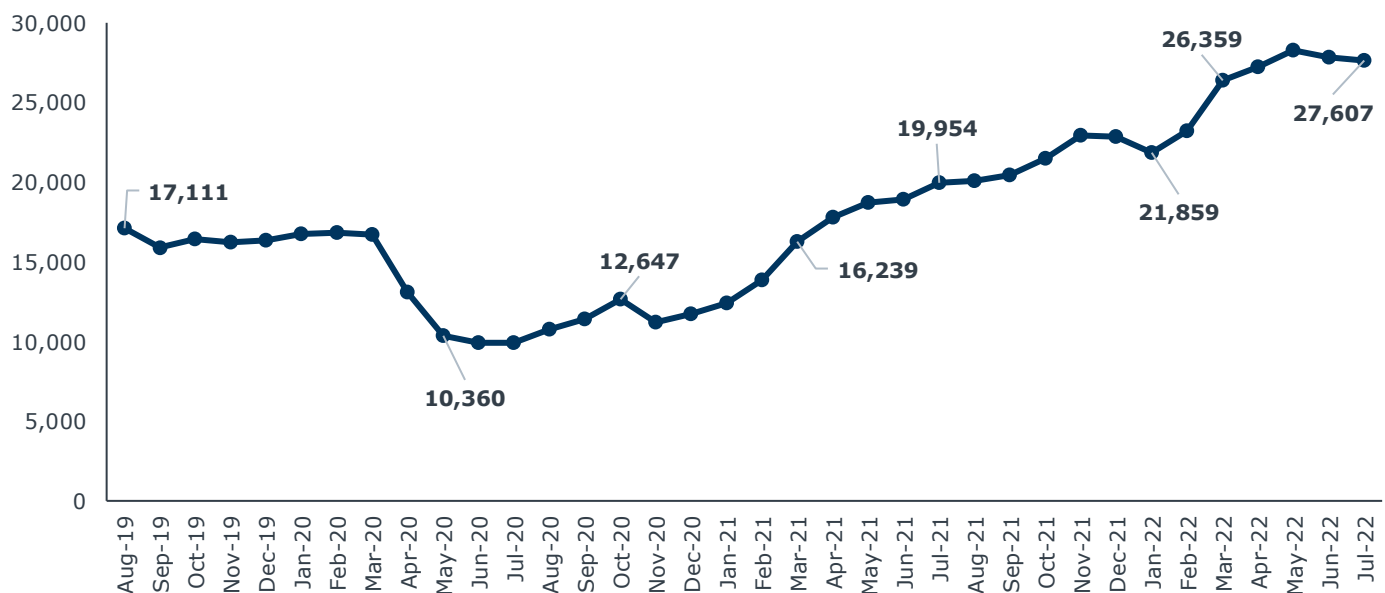
111,436 job postings

Relevant Jobs Posted in the Past Year

August 2021 to July 2022, Regional Data

Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals over Time

August 2019 to July 2022, Regional Data



Source: EAB analysis. Lightcast Analyst.

National Analysis of Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals

National employer demand trends suggest a high need for program graduates. The average monthly demand for relevant professionals increased by an average 1.73% per month between August 2019 to July 2022, outpacing the 1.29% average monthly demand growth for all bachelor's-level professionals. Employers posted a high number of relevant job postings in the last 12 months (i.e., 794,478). This indicates graduates will likely enter a strong labor market with increasing employer demand.

+1.73%

Average Monthly Demand Growth

August 2019 to July 2022,
National Data

- Average monthly growth of 2,259 job postings.
- During the same period, demand for all bachelor's-level professionals grew 1.29%.

2,259 job postings

Average Monthly Demand

August 2019 to July 2022,
National Data

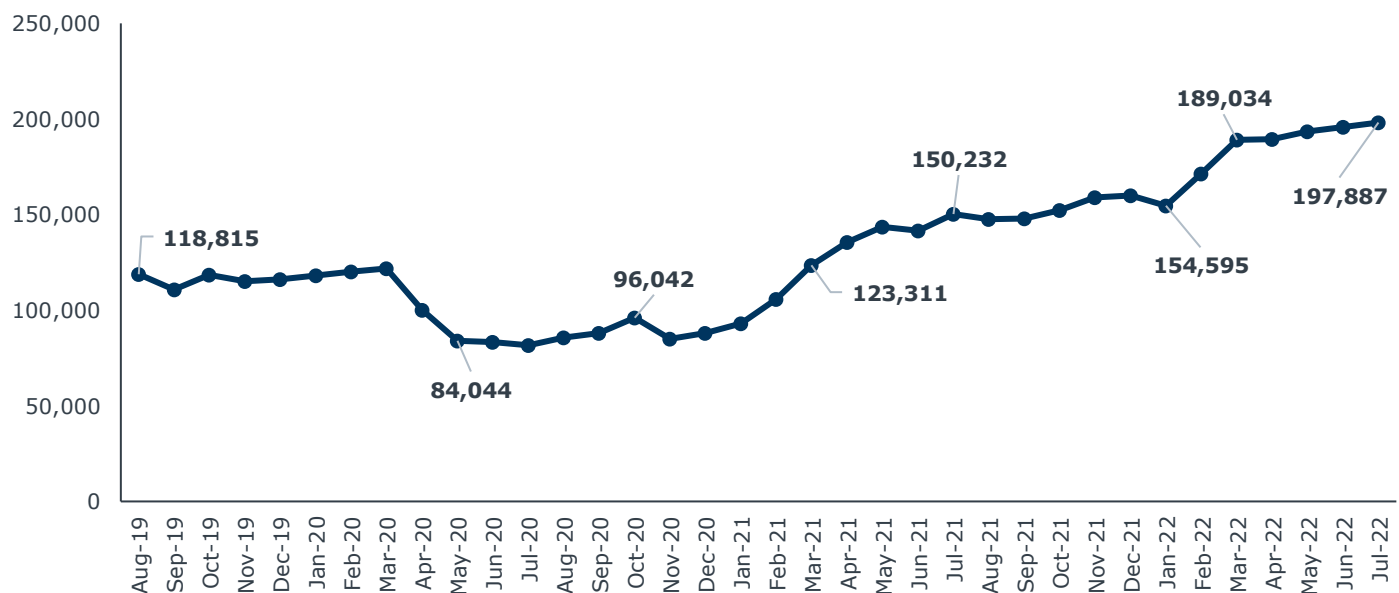
794,478 job postings

Relevant Jobs Posted in the Past Year

August 2021 to July 2022,
National Data

Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals over Time

August 2019 to July 2022, National Data



Source: EAB analysis. Lightcast Analyst.

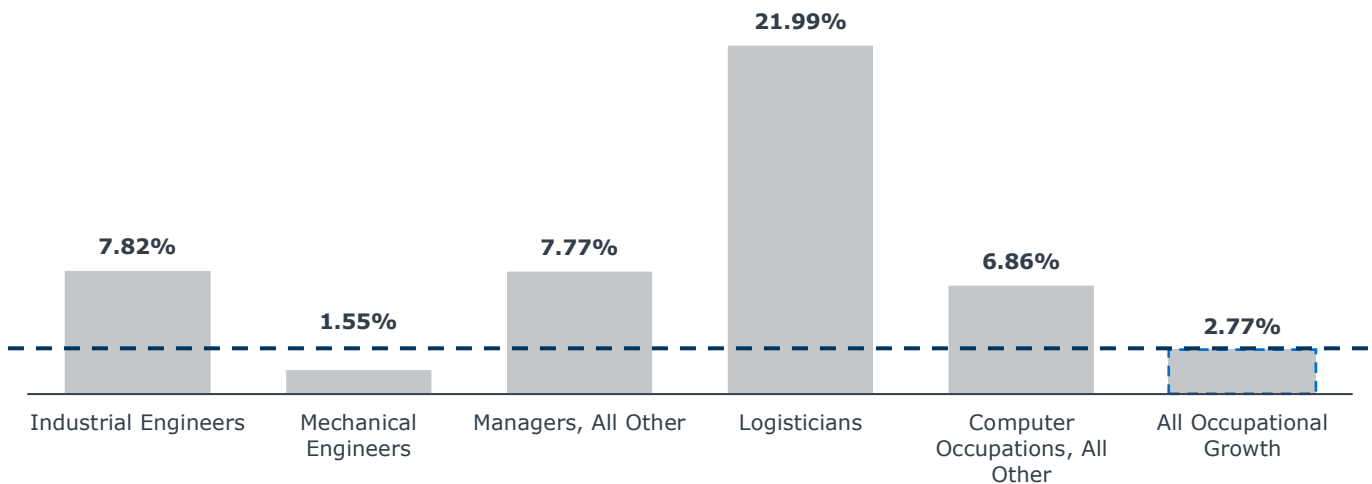
Analysis of **Employment** for Mechanical and Manufacturing Engineering Professionals

Employment is projected to increase faster than average in four of the five top relevant occupations both regionally and nationally. This indicates employment opportunities for graduates will likely increase across the next 10 years. Employment for the "Logisticians" occupation is projected to significantly outpace the growth of all occupations across the next decade in both analyzed markets. The [Bureau of Labor Statistics](#) expects this growth to stem from employers increasingly requiring workers to move products more efficiently, solve problems, and identify areas for improvement.

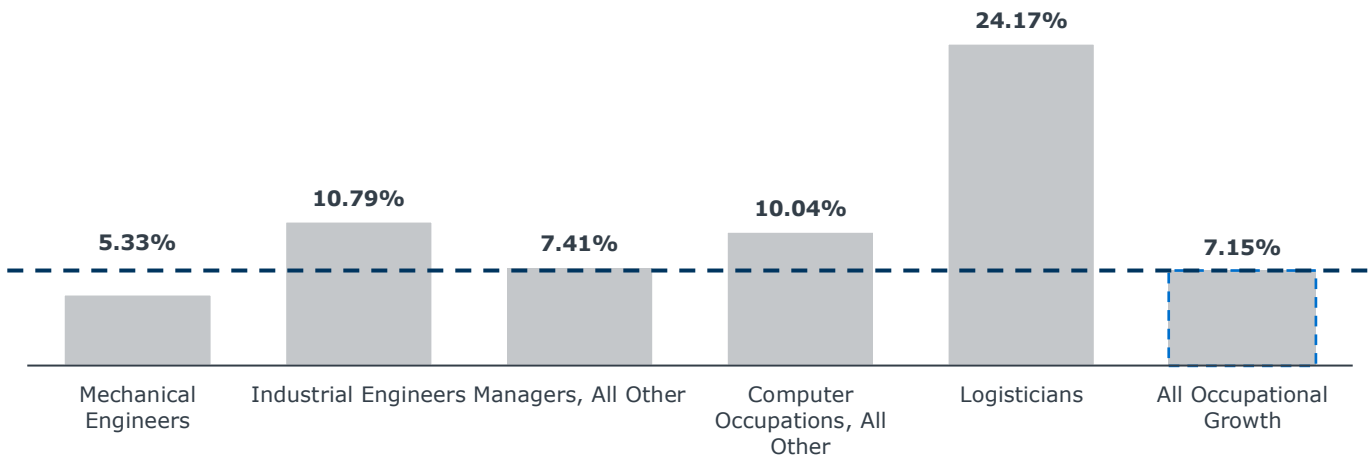
While these occupations represent the most common occupations appearing in job postings for bachelor's-level mechanical and manufacturing engineering professionals, the projected employment data considers all jobs within an occupation at all degree levels.

Projected Employment in Top Occupations¹

2022-2032, Regional Data



2022-2032, National Data



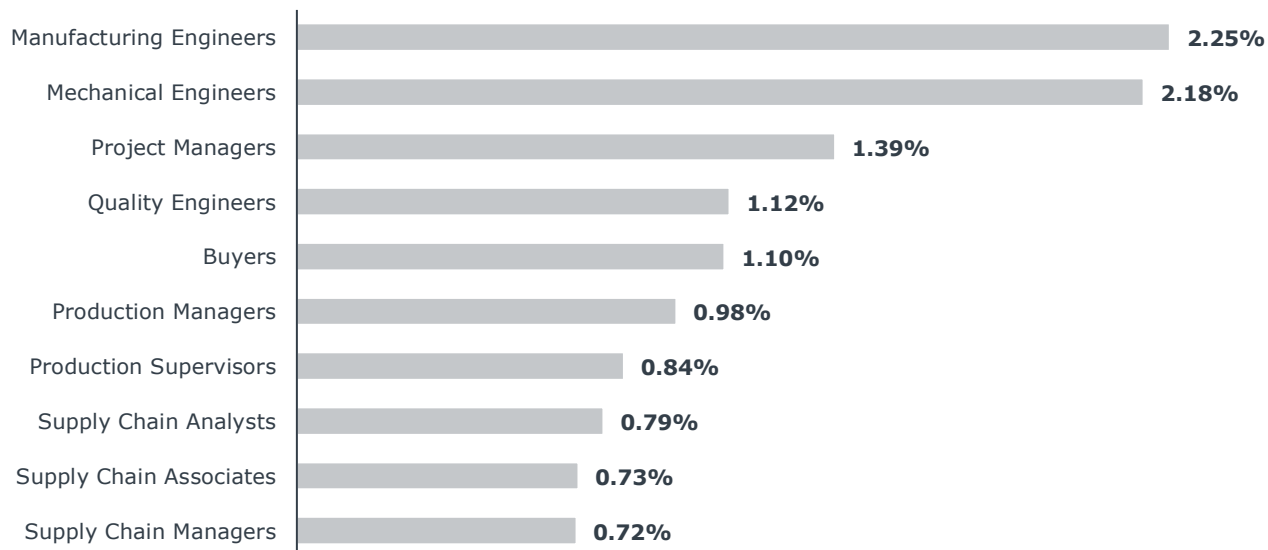
— — — The dashed blue line represents the projected employment growth across all occupations from 2022 to 2032.

1) Top occupations refer to the occupations in which employers most often seek relevant professionals.

Top Titles in Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals

August 2021 to July 2022, Regional Data

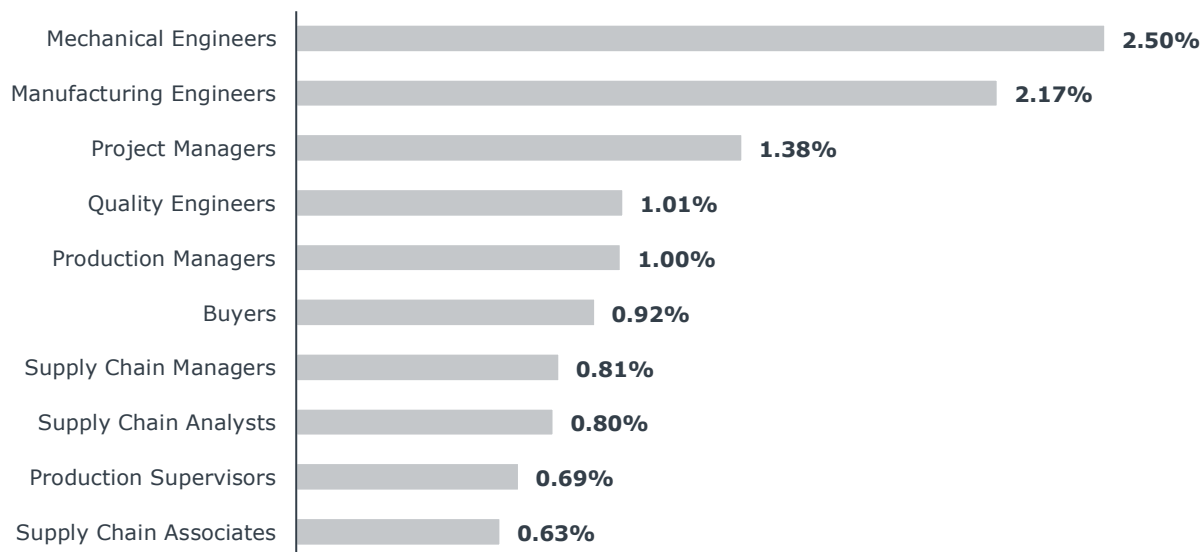
n= 111,436 job postings



Top Titles in Job Postings for Bachelor's-Level Mechanical and Manufacturing Engineering Professionals

August 2021 to July 2022, National Data

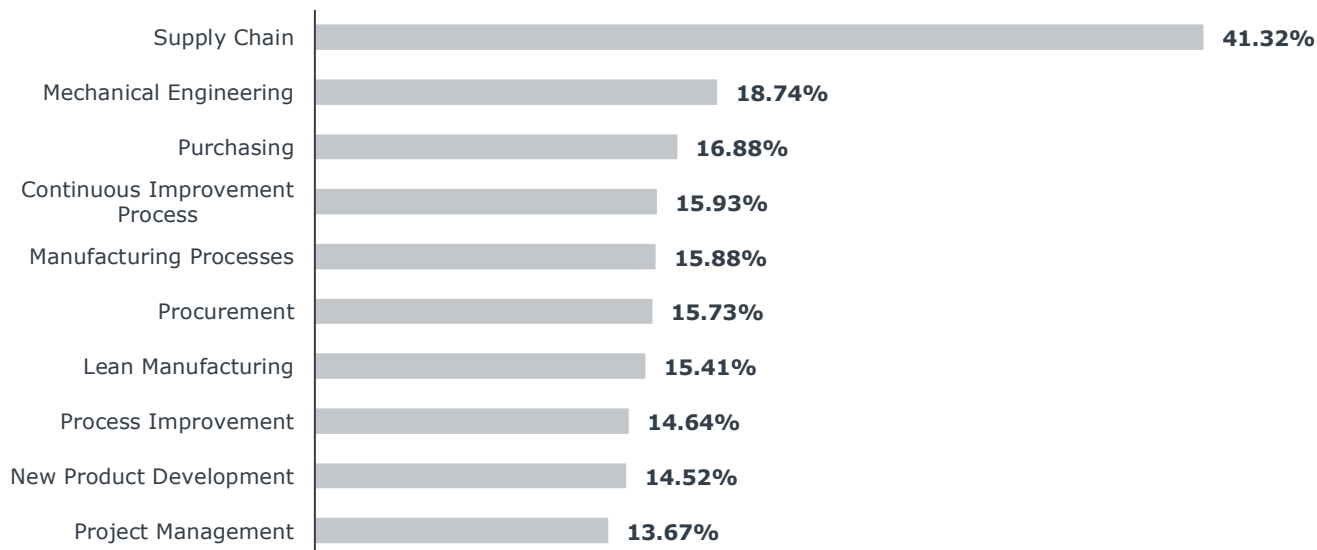
n= 794,478 job postings



Top Skills Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, Regional Data

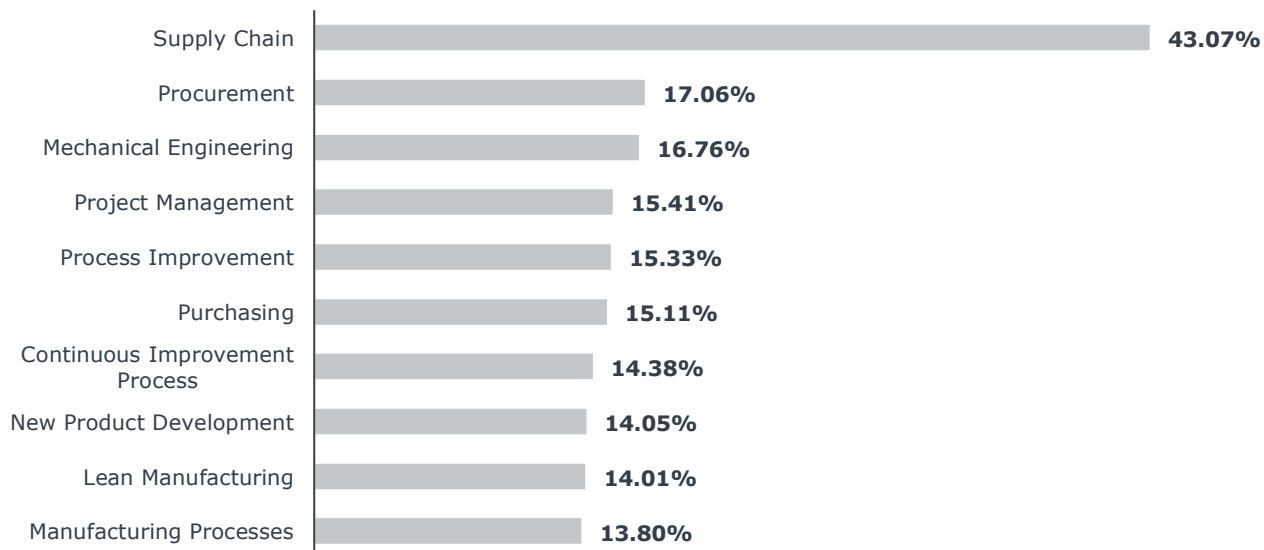
n= 111,436 job postings



Top Skills Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, National Data

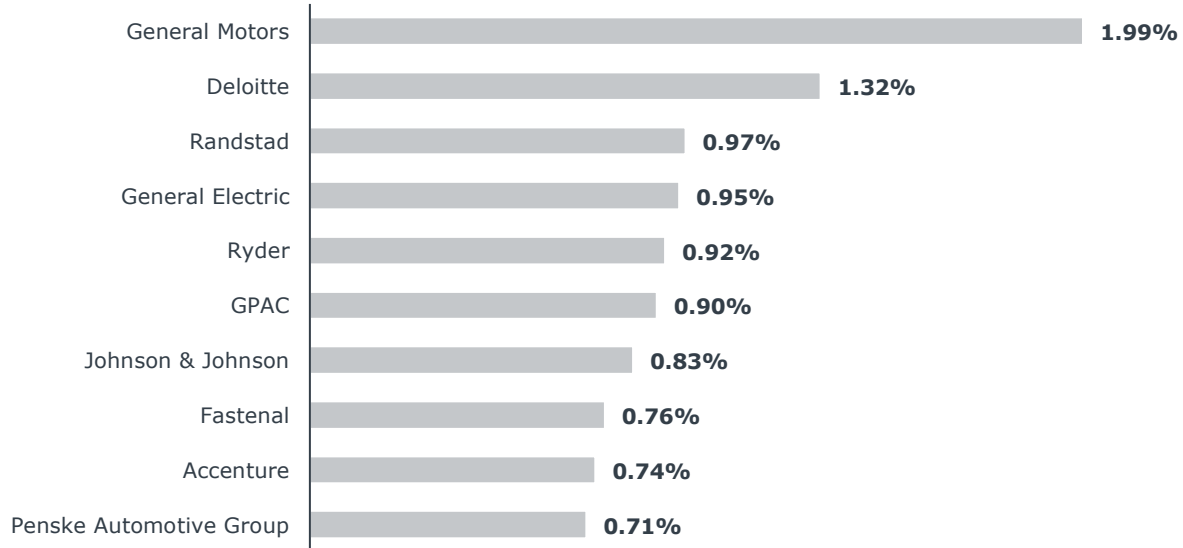
n= 794,478 job postings



Top Employers Seeking Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, Regional Data

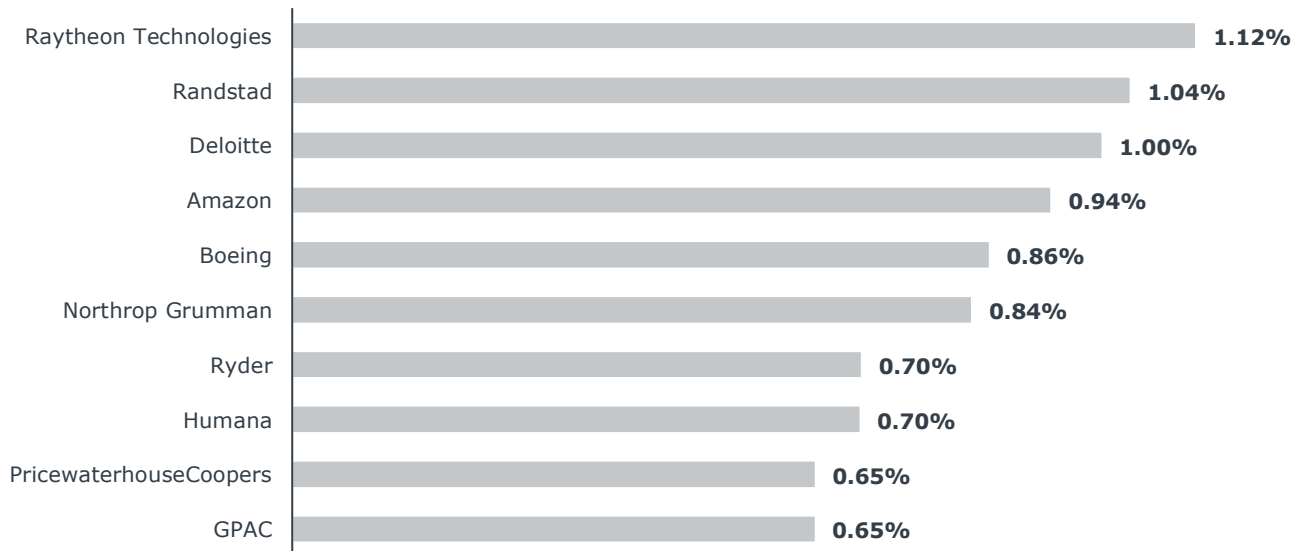
n= 111,436 job postings



Top Employers Seeking Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, National Data

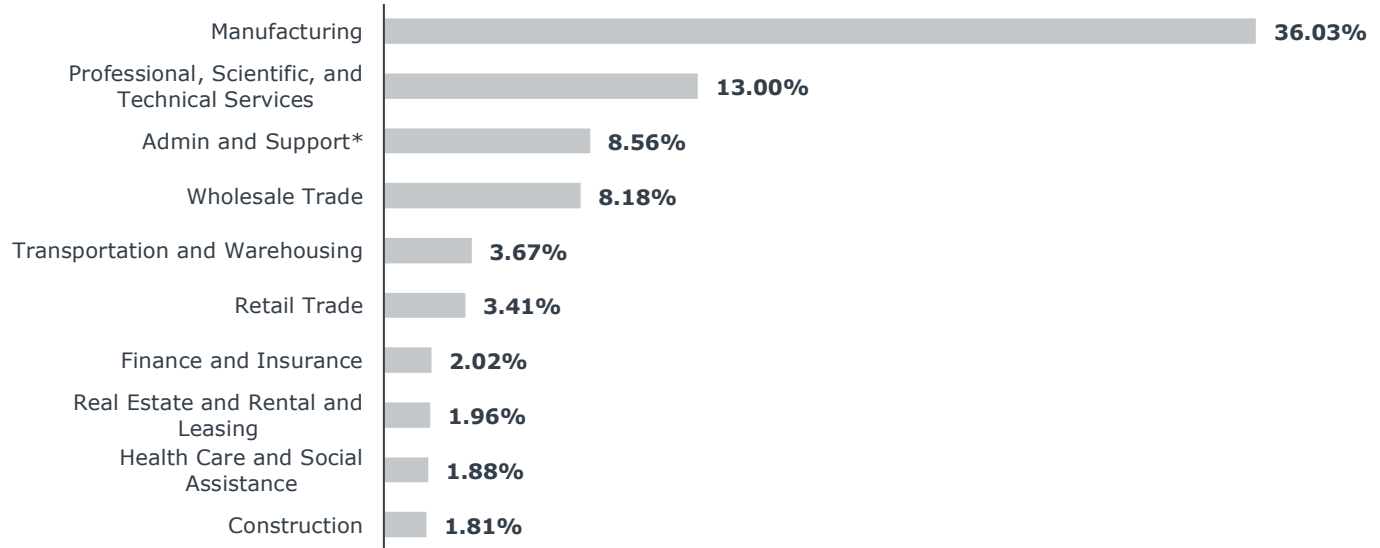
n= 794,478 job postings



Top Industries Advertising Bachelor's-Level Mechanical and Manufacturing Engineering Job Postings

August 2021 to July 2022, Regional Data

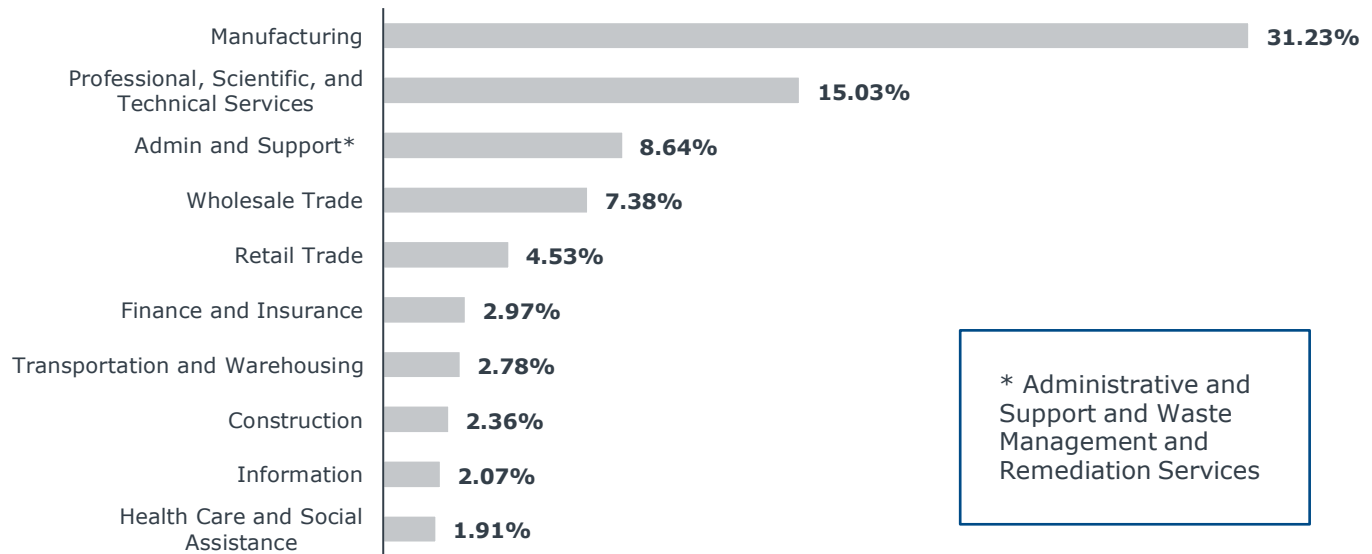
n= 111,436 job postings



Top Industries Advertising Bachelor's-Level Mechanical and Manufacturing Engineering Job Postings

August 2021 to July 2022, National Data

n= 794,478 job postings



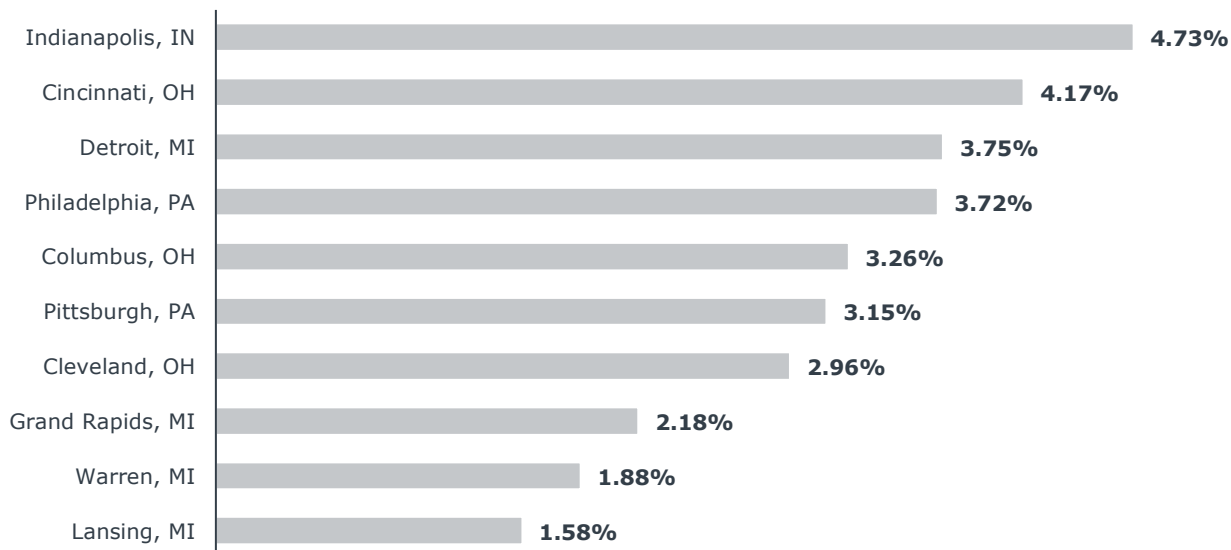
Lightcast Analyst often classifies job postings from staffing companies under the category "Administrative and Support and Waste Management and Remediation Services."



Top Cities Seeking Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, Regional Data

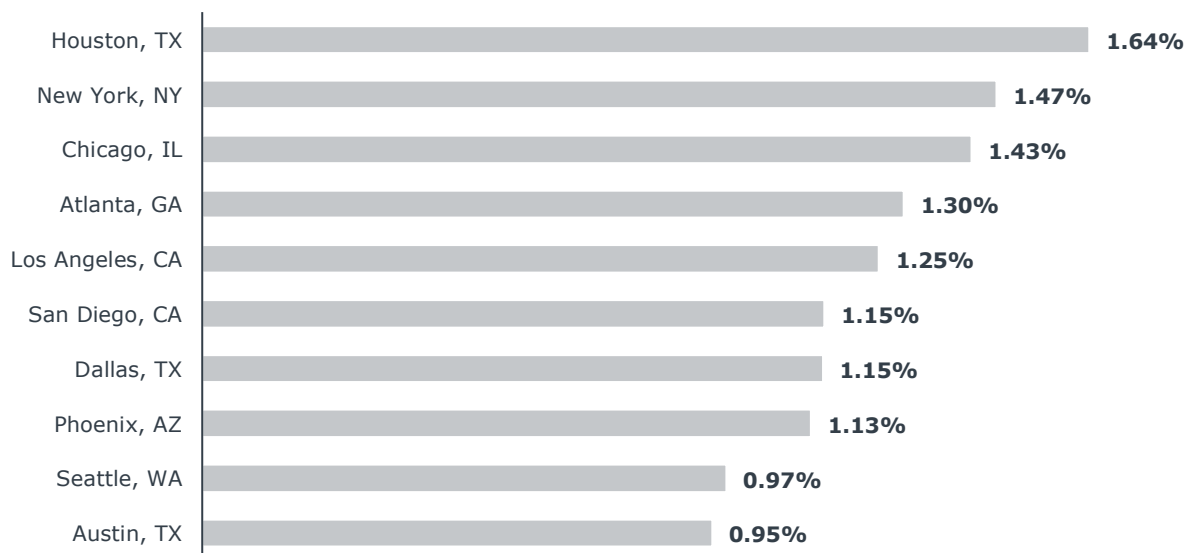
n= 111,436 job postings



Top Cities Seeking Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, National Data

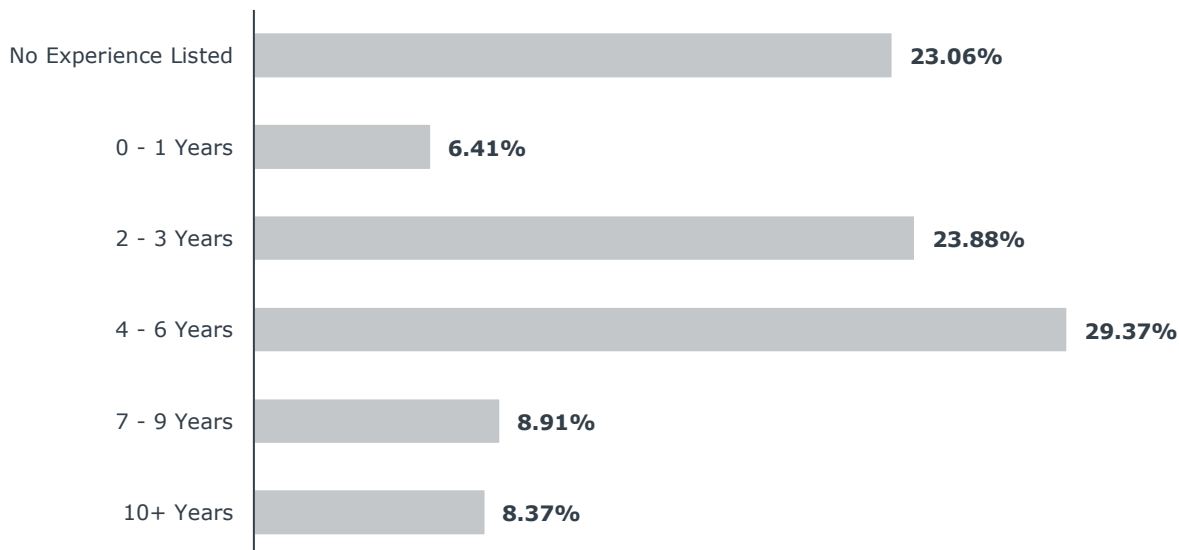
n= 794,478 job postings



Experience Levels Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, Regional Data

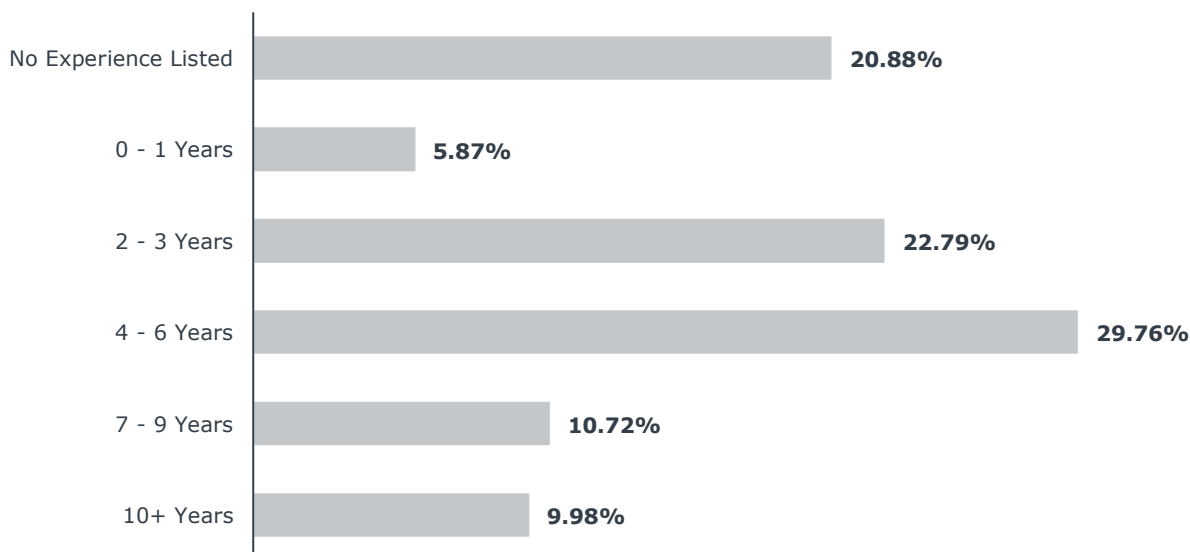
n= 111,436 job postings



Experience Levels Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, National Data

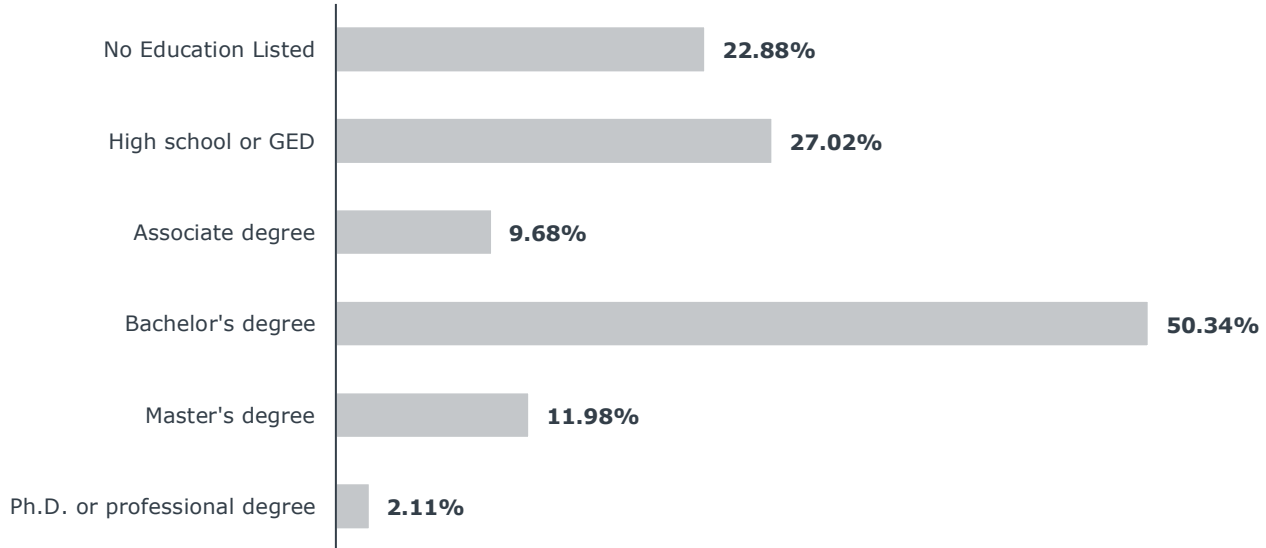
n= 794,478 job postings



Education Levels Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, Regional Data

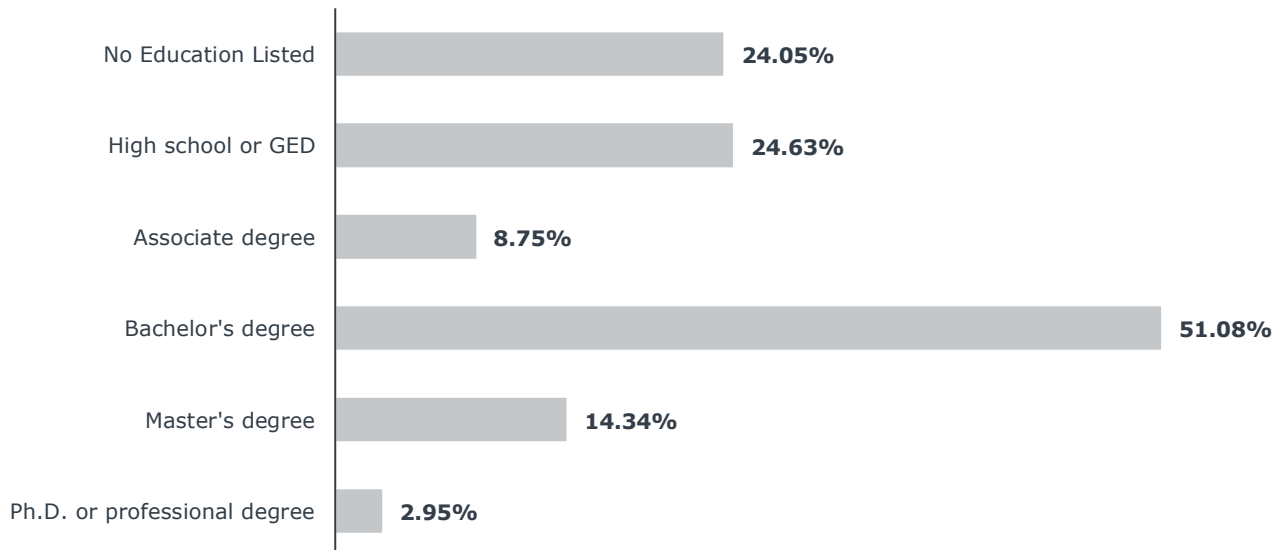
n= 221,378¹ job postings



Education Levels Requested of Bachelor's-Level Mechanical and Manufacturing Engineering Applicants

August 2021 to July 2022, National Data

n= 1,555,218¹ job postings



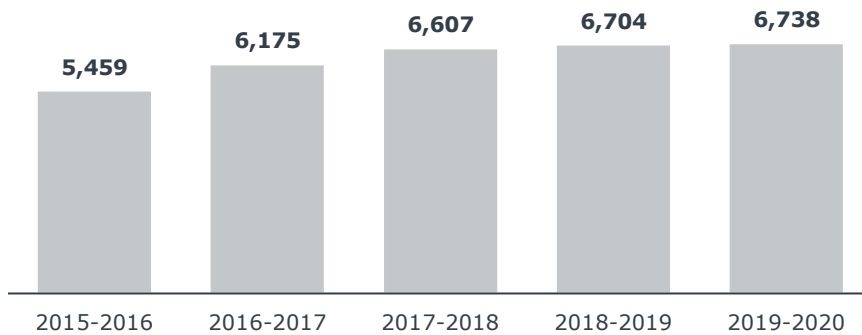
1) The n-value reflects the number of job postings requesting any degree level mechanical and manufacturing engineering applicants rather than the number of postings requesting bachelor's-level mechanical and manufacturing engineering applicants.

Regional Analysis of CIP Codes 14.1901 ("Mechanical Engineering") and 14.3601 ("Manufacturing Engineering")¹ Bachelor's-Level Completions

Reported regional degree completions for the profiled CIP codes increased by an annual 5.52% on average between the 2015-2016 and 2019-2020 academic years, indicating rising student demand. In the same period, the number of institutions reporting relevant completions increased by an average 4.94% annually. Completions growth outpacing institutional growth indicates an opportunity for new programs to capture student demand.

Completions Reported over Time

2015-2016 to 2019-2020 Academic Years, Regional Data



+5.52%

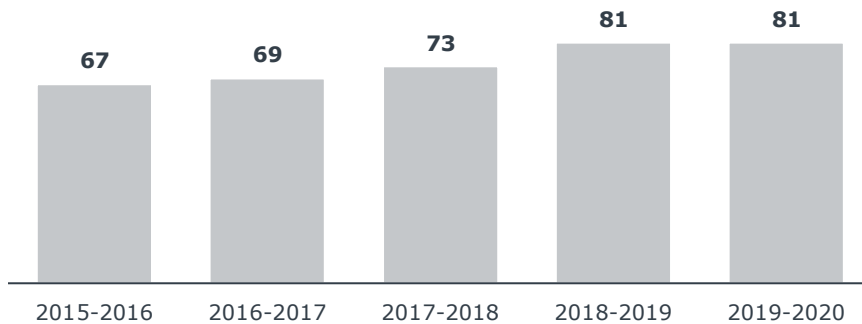
Average Annual Completions Growth

2015-2016 to 2019-2020 Academic Years, Regional Data

- Average annual 4.94% growth in number of institutions in the same period.

Institutions Reporting Completions over Time

2015-2016 to 2019-2020 Academic Years, Regional Data



1.23%

Institutions Reporting Completions with a 100% Distance-Delivery Option

2019-2020 Academic Year, Regional Data

83.19

Mean Completions per Institution Reporting

2019-2020 Academic Year, Regional Data

- An increase from the 81.47 mean completions reported in the 2015-2016 academic year.

45.00

Median Completions per Institution Reporting

2019-2020 Academic Year, Regional Data

- A decrease from the 49.00 median completions reported in the 2015-2016 academic year.

1) The aggregated completions data for CIP codes 14.1901 and 14.3601 is offered as an indicator of student trends because mechanical and manufacturing engineering is not classified as a specific CIP code in NCES data.

Regional Analysis of CIP Codes 14.1901 ("Mechanical Engineering") and 14.3601 ("Manufacturing Engineering") Bachelor's-Level Completions

Relevant completions at nine of the top 10 institutions reporting completions increased between the 2015-2016 and 2019-2020 academic years. Of these nine institutions, only three experienced a loss in market share, suggesting rapid overall market growth. Overall, these trends suggest a favorable market for program launch.

Institutions with Most Reported Completions

2015-2016 and 2019-2020 Academic Year, Regional Data

Institution	Reported Completions, 2015-2016 Academic Year	Market Share, 2015-2016 Academic Year	Reported Completions, 2019-2020 Academic Year	Market Share, 2019-2020 Academic Year
Pennsylvania State University	Not Offered	Not Offered	588	8.73%
Purdue University-Main Campus	346	6.34%	376	5.58%
Michigan State University	220	4.03%	289	4.29%
University of Michigan-Ann Arbor	299	5.48%	289	4.29%
Michigan Technological University	251	4.60%	283	4.20%
Kettering University	159	2.91%	260	3.86%
Ohio State University-Main Campus	238	4.36%	248	3.68%
University of Cincinnati-Main Campus	138	2.53%	238	3.53%
University of Akron Main Campus	128	2.34%	197	2.92%
University of Dayton	145	2.66%	195	2.89%

National Analysis of CIP Codes 14.1901 ("Mechanical Engineering") and 14.3601 ("Manufacturing Engineering")¹ Bachelor's-Level Completions

Relevant degree completions increased 6.39% each year on average between the 2015-2016 and the 2019-2020 academic years, indicating increasing student demand. In the same period, the number of institutions reporting relevant completions grew 3.24% on average annually. These trends indicate a possible opportunity to enter the market.

Completions Reported over Time

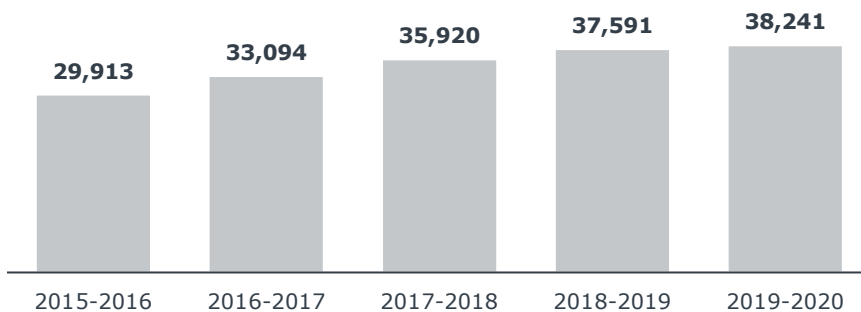
2015-2016 to 2019-2020 Academic Years, National Data

+6.39%

Average Annual Completions Growth

2015-2016 to 2019-2020 Academic Years, National Data

- Average annual 3.24% growth in number of institutions in the same period.



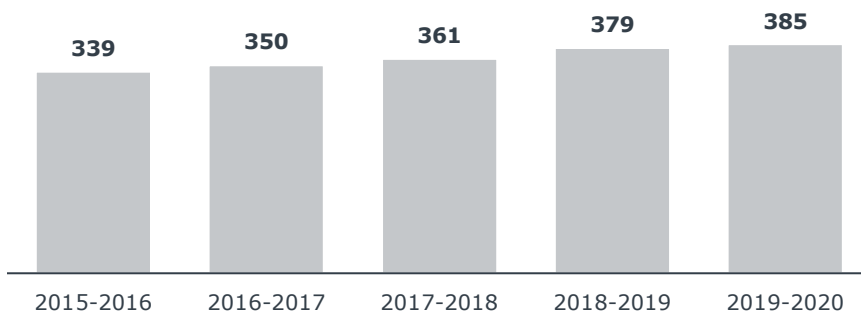
Institutions Reporting Completions over Time

2015-2016 to 2019-2020 Academic Years, National Data

1.82%

Institutions Reporting Completions with a 100% Distance-Delivery Option

2019-2020 Academic Year, National Data



99.33

Mean Completions per Institution Reporting

2019-2020 Academic Year, National Data

- An increase from the 88.24 mean completions reported in the 2015-2016 academic year.

71.00

Median Completions per Institution Reporting

2019-2020 Academic Year, National Data

- An increase from the 67.00 median completions reported in the 2015-2016 academic year.

1) The aggregated completions data for CIP codes 14.1901 and 14.3601 is offered as an indicator of student trends because Mechanical and Manufacturing Engineering is not classified as a specific CIP code in NCES data.

National Analysis of Codes 14.1901 ("Mechanical Engineering") and 14.3601 ("Manufacturing Engineering") Bachelor's-Level Completions

Similar to regional data, between the 2015-2016 and 2019-2020 academic years, completions for all top 10 institutions reporting completions increased. The market share was evenly distributed, with the top 10 institutions reporting no more than 1.54% of completions in the 2019-2020 academic year. Additionally, only five out of top 10 institutions reporting completions increased their market share despite the gain in completions experienced by all top 10 institutions reporting completions which indicates new programs outside of the top 10 are benefitting from the growing student demand.

Institutions with Most Reported Completions

2015-2016 and 2019-2020 Academic Year, National Data

Institution	Reported Completions, 2015-2016 Academic Year	Market Share, 2015-2016 Academic Year	Reported Completions, 2019-2020 Academic Year	Market Share, 2019-2020 Academic Year
Pennsylvania State University	Not Offered	Not Offered	588	1.54%
Georgia Institute of Technology-Main Campus	510	1.70%	572	1.50%
University of Central Florida	339	1.13%	461	1.21%
Texas A & M University-College Station	249	0.83%	441	1.15%
Iowa State University	358	1.20%	429	1.12%
The University of Alabama	203	0.68%	407	1.06%
Virginia Polytechnic Institute and State University	362	1.21%	407	1.06%
Purdue University-Main Campus	346	1.16%	376	0.98%
Texas Tech University	227	0.76%	357	0.93%
University of Maryland-College Park	338	1.13%	336	0.88%

Appendix: Research Process and Sources

Research Questions

The requesting partner asked:

- **How has demand for graduates of my program evolved over time?**
- **In what positions do employers demonstrate the greatest need for graduates?**
- **In which industries should the program prepare students to work?**
- **What skills should the program teach to prepare students to meet employer demand?**
- **Which employers demonstrate the greatest demand for graduates?**
- **In which cities do employers demonstrate the greatest demand for potential graduates?**
- **What experience level do employers most frequently request from program graduates?**
- **What education level do employers most frequently request from program graduates?**
- **How many students graduate from similar programs locally, and how has this changed over time?**
- How are similar programs structured?
- How are similar programs delivered?
- What experiential or practical learning do similar programs offer?
- What accreditation do similar programs hold?
- What courses are included in the curricula of similar programs?

Bolded questions were addressed within this analysis; remaining questions will be addressed if partner pursues additional research.

Research Limitations

EAB's market insights research guides strategic programmatic decisions at partner institutions. The Market Insights Service combines qualitative and quantitative data to help administrators identify opportunities for new program development, assess job market trends, and align curriculum with employer and student demand.

Unless stated otherwise, this report includes data from online job postings from August 2021 to July 2022. To best estimate employer demand for bachelor's-level mechanical and manufacturing engineering professionals, the Forum analyzed job postings for bachelor's-level professionals with relevant skills (e.g., "Continuum Mechanics," "Manufacturing Engineering").

Definitions

"CIP" code refers to the Classification of Instructional Programming code.

"Nation" and "nationally" refer to the United States.

"Region" and "Regionally" refer to Indiana, Michigan, Ohio, Pennsylvania.

Project Sources

The Forum consulted the following sources for this report:

- EAB's internal and online research libraries
- Lightcast Analyst, described below
- U.S. Bureau of Labor Statistics
- U.S. National Center for Education Statistics (NCES)

Labor Market Intelligence Partner: Lightcast

This report includes data made available through EAB's partnership with Lightcast (formerly Economic Modeling Specialists International), a labor market analytics firm serving higher education, economic development, and industry leaders in the U.S., Canada and the United Kingdom.

Lightcast curates and maintains the most comprehensive labor market data sets available for academic program planning, providing real-time job posting data, workforce and alumni outcomes data, and traditional government sources of data. Under this partnership, EAB may use Lightcast's proprietary Analyst™ and Alumni Insight™ tools to answer partner questions about employer demand, the competitive landscape, in-demand skills, postings versus actual hires, and skills gaps between job postings and professionals in the workforce. The Lightcast tools also provide EAB with in-depth access to unsuppressed, zip-code-level government data for occupations, industries, programs, and demographics. For more complete descriptions of the Lightcast tools, visit:

- <http://www.economicmodeling.com/analyst/>
- <https://www.economicmodeling.com/alumni-insight/>

To learn more about Lightcast and its software and services, please contact Bob Hieronymus, Vice President of Business Development at bob.hieronymus@economicmodeling.com or (208) 883-3500.



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MME 5-10-22

Final Audit Report

2022-05-10

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By:	Kathryn Boyle (kmboyle@bgsu.edu)
Status:	Signed
Transaction ID:	CBJCHBCAABAARG9gE1d45zZpRZbdLgUDXrwCX8E8OCYr

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MME 5-10-22 - signed

Final Audit Report

2022-05-24

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