Ohio | Board of Regents
University System of Ohio

John R. Kasich, Governor
John Carey, Chancellor

# INITIAL INQUIRY
# REQUEST TO OFFER A NEW PROGRAM

**Date of submission:** *Date to come (sent after EPC)*

**Name of institution:** Kent State University

**Primary institutional contact for this request:**

| | |
|---|---|
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**Name of new program:** Mechatronics Engineering major, Bachelor of Science degree

*For institutions that are already approved/authorized by the chancellor*

☐ New degree designation
☒ New program within an existing degree (e.g., major, minor, concentration)
☐ New technical certificate program
☐ New licensure/endorsement area (educator preparation)

**Delivery options (check all that apply):**

☒ Campus-based
☐ Online/hybrid delivery
☐ Flexible or accelerated delivery
☐ Offering the program at a new offsite location
☐ Offering the program at an existing offsite location
☐ Program contains off-campus experiences (e.g., internship, clinical, practicum, student teaching)

**The institution will be seeking specialized accreditation for the program:**

☐ No ☒ Yes

**If "yes," provide the name of the accrediting agency:**

Kent State University will seek accreditation for the degree program from the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). ABET accredits more than 3,100 programs at more than 600 colleges and universities worldwide, including Kent State's associate degree programs in mechanical engineering technology and electrical/electronic engineering technology.

**Provide a brief description of the request.**

Kent State University proposes to offer a Bachelor of Science degree in Mechatronics Engineering, to be administered by the university's College of Applied Engineering, Sustainability and Technology on the Kent Campus.

Mechatronics engineering focuses on the application of the basic engineering principles of mechanical, electrical, computer and control systems; the field revolves around the design, construction and operation of automated systems, robots and intelligent products, which result from the integration of software and hardware. Using automated systems is becoming more popular for operating equipment/machinery on manufacturing lines, boilers and aircraft to reduce labor costs, increase precision and accuracy and provide quality and safety for workers. Sophisticated robots may be programmed using electronic control to perform precise, mechanical functions for surgical purposes and those used to handle hazardous materials.

Mechatronic devices can be found in agriculture, buildings, homes, automobiles, the toy and entertainment industry and in aids for the elderly and disabled. Mechatronics engineers can work in any company that develops, designs or manufactures and markets these devices. Opportunities exist in manufacturing, sales as well as research.

**Explain the academic unit's rationale for making the request.**

This request is part of the Kent State University's strategic vision to drive research and innovation, expand partnerships and meet industry needs for qualified graduates. There are very few mechatronics engineering programs across the country. Only two universities—Kennesaw State University in Georgia and California State University in Chico—currently offer an ABET-accredited mechatronics engineering program. Only Purdue University Calumet offers an ABET-accredited mechatronics engineering technology program.

With increasing demand in the robotics industry, there will be more demand for employees, see table 1 below. The U.S. Department of Labor has classified both robotics engineers and robotics technicians as "bright outlook" careers.[1]

**Table 1: Robotic Industry Data**

| Robots Ordered by North American Companies in 2015 | Predicted Growth of Industrial Robotics Market by 2020 | New Robotics-Related Jobs by 2020 |
|---|---|---|
| **31,464**[2] | **$41.17 billion**[3] | **500,000+**[4] |

According to the National Association of College and Employers, the top-paid engineering graduates for the class of 2015 were mechatronics engineering majors, see table 2 on next page. This field did not even make the list for the class of 2014, which indicates that this is a quickly growing field.

[1] Bright Outlook Occupations 2014-2024. Occupational Information Network (O*NET), U.S. Department of Labor. Retrieved from www.onetonline.org/help/bright.
[2] Robotic Industries Association (February 10, 2016). North American Robotics Market Sets New Records in 2015. Retrieved from www.robotics.org/content-detail.cfm/Industrial-Robotics-News/North-American-Robotics-Market-Sets-New-Records-in-2015/content_id/5951.
[3] Allied Market Research (May 2014). Industrial Robotics Market is Expected to Reach $41.17 Billion, Globally, by 2020. Retrieved from www.alliedmarketresearch.com/press-release/industrial-robotics-market-is-expected-to-reach-41-17-billion-globally-by-2020.html.
[4] Williams, T. (October 23, 2015). Breakout Career: Robotics Will Create Over 500,000 New Jobs by 2020. GoodCall. Retrieved by www.goodcall.com/news/breakout-career-robotics-will-create-over-500000-new-jobs-by-2020-02211.

**Table 2: Top-Paid Engineering Majors**[5]

| Class of 2015 | |
|---|---|
| Mechatronics Engineering | $80,859 |
| Petroleum Engineering | $74,996 |
| Computer Engineering | $68,820 |
| Aerospace Engineering | $67,658 |
| Electrical Engineering | $67,593 |

| Class of 2014 | |
|---|---|
| Petroleum Engineering | $86,255 |
| Electrical Engineering | $68,778 |
| Mining Engineering | $68,153 |
| Chemical Engineering | $68,061 |
| Computer Engineering | $68,053 |

Establishment of a Mechatronics Engineering major at Kent State is also the logical evolution to a $14.99 million investment made by the State of Ohio[6] two years ago for the Robotics and Advanced Manufacturing Technology Education Collaborative (RAMTEC). This collaborative, led by Tri-Rivers Career Center and eight partner career centers in the state (including Portage Lakes Career Center and Cuyahoga Valley Career Center in Northeast Ohio), has used the grant money to prepare high school and adult students with advanced manufacturing and engineering skills. However, to professionally advance within many companies, most employers require a bachelor's degree. The proposed Mechatronics Engineering major will offer graduates of the career centers partnered with RAMTEC an opportunity to pursue a bachelor degree in this field.

The opportunities for collaboration with the technology and manufacturing corridor in Ohio are significant. Implementing the mechatronics engineering program at Kent State will allow the region to capitalize on and strengthen these existing relationships, by granting employers the opportunity to give input into the curriculum, enhancing their own ties to the region by developing and mentoring competent engineers. This will positively impact the community by supplying talented graduates that possess the necessary skills, knowledge and experience to be "job ready" upon graduation. This is invaluable for replenishing an aging workforce.

The base infrastructure for the proposed Mechatronics Engineering major is already in place within the college through its existing BS degree programs in Aerospace Engineering and Applied Engineering (Mechatronics concentration). Since the curriculum of the first two years are similar in all pure engineering programs, the proposed major will be coordinated with those majors, requiring the same foundational technology and engineering courses, as well as physics and mathematics courses.

Kent State will continue to offer the Applied Engineering major–Mechatronics concentration as that program prepares students for careers in the applied and systems engineering fields. The focus for that program is on application and implementation, and graduates find jobs in managing and supporting the design, manufacture and use of mechanical/electrical systems that move. In contrast, the proposed Mechatronics Engineering major will provide students with a more theoretical, scientific approach to the discipline. The Mechatronics Engineering major will require higher level calculus-based mathematics and fewer hands-on laboratory courses. Graduates will be employed to investigate complex electrical/mechanical problems and to develop engineering methods to address them.

[5] First-Destination Survey, National Association of Colleges and Employers. Retrieved from www.naceweb.org/job-market/graduate-outcomes/first-destination.
[6] RAMTEC Consortium receives $14.99 Million Straight A Grant (June 23, 2014). Retrieved from https://tririvers.com/ramtec-consortium-receives-14-99-million-straight-a-grant-2.

Kent State will work to secure ABET accreditation for the proposed Mechatronics Engineering major upon matriculation of the program's first cohort. ABET-accreditation is important not only because it ensures a quality education, but because graduates of an ABET-accredited program who have passed the Fundamentals of Engineering examination and have four years of engineering experience become eligible for the Principles and Practice of Engineering examination to become a licensed professional engineer. This engineering license is valuable to job seekers as many engineering organizations require their employees to hold this credential. While graduates from non-ABET accredited programs may also take the examinations, they must have eight years of engineering experience.

**Indicate whether additional faculty and staff will be needed to support the proposed request.**

It is anticipated that the College of Applied Engineering, Sustainability and Technology will hire one additional full-time tenure-track faculty member with a doctorate in mechatronics engineering, electrical engineering or related field. This faculty member will support the Applied Engineering major–Mechatronics concentration and will transition to the proposed Mechatronics Engineering major upon implementation of that program. The college will determine if additional faculty will be needed based on enrollment projections each year in the proposed program.