



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

This template is to be used only by programs that have received specific written approval from the Provost's office to proceed with internal proposal development and review. The proposal template should be completed in full and submitted to the University Provost's Office [[mailto: curriculumplanning@asu.edu](mailto:curriculumplanning@asu.edu) ]. It must undergo all internal university review and approval steps including those at the unit, college, and university levels. A program **may not** be implemented until the Provost's Office notifies the academic unit that the program may be offered.

### MASTER'S DEGREE PROGRAM

**Name of proposed degree program:** Master of Science (MS) in Robotics and Autonomous Systems

**Proposed title of major:** Robotics and Autonomous Systems

**Master's degree type:** MS - Master of Science

If Degree Type is "Other", provide degree type and proposed abbreviation: N/A

**Is a program fee required?** No, a program fee is not required.

*Note: for more information about program fee requests, visit <https://provost.asu.edu/curriculum-development/changemaker/form-instructions#fees>*

Is the unit willing and able to implement the program if the fee is denied? N/A

**Requested effective term and year:** Spring 2019

(The first semester and year for which students may begin applying to the program)

**Delivery method and campus or location options:** *select all locations that apply*

- |   |  |  |                                      |                               |                                 |
|---|--|--|--------------------------------------|-------------------------------|---------------------------------|
| <input type="checkbox"/> Downtown Phoenix | <input checked="" type="checkbox"/> Polytechnic<br>-Standalone<br>-Systems Engineering | <input checked="" type="checkbox"/> Tempe<br>-Standalone<br>-Artificial Intelligence<br>-Electrical Engineering<br>-Mechanical and Aerospace Engineering | <input type="checkbox"/> Thunderbird | <input type="checkbox"/> West | <input type="checkbox"/> Other: |
|---|--|--|--------------------------------------|-------------------------------|---------------------------------|

☐ **Both on-campus and** ☐ ASU Online\* - (check applicable campus(es) from options listed above)

☐ ASU Online only (all courses online and managed by ASU Online)

*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in [Curriculum ChangeMaker](#) to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process.*

**Do Not Fill in this information: Office Use Only**

**Plan Code:**

**CIP Code:**

### PROPOSAL CONTACT

**Name:** Pat Phelan **Title:** FSE Assistant Dean for Graduate Programs  
**Phone number:** 480-965-1625 **Email:** phelan@asu.edu



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### DEAN APPROVAL(S)

This proposal has been approved by all necessary unit and college/school levels of review, and the college/school(s) has the resources to offer this degree program. I recommend implementation of the proposed concentration.

*Note: An electronic signature, an email from the dean or dean's designee, or a PDF of the signed signature page is acceptable.*

College/School/Division Dean name: James S. Collofello

Signature:

A handwritten signature in black ink, appearing to read 'James S. Collofello', written over a horizontal line.

Date:

4/2/18

**Please note:** Proposals for new degrees also require the review and recommendation of approval from the University Graduate Council, Curriculum and Academic Programs Committee (CAPC), the Academic Senate (2 readings), and the Office of the Provost before they can be put into operation.

**The final approval notification will come from the Office of the Provost.**

---

#### **Standalone Parent Degree:** *Master of Science in Robotics and Autonomous Systems*

**College/School:** Ira A. Fulton Schools of Engineering

*Note: Program ownership is coded at the College/School level first and may not be a center, department or division apart from it.*

**Department/Division/School:** Dean's Office, Ira A. Fulton Schools of Engineering

**Proposing faculty group** (if applicable): ASU Robotics Faculty Group

---

#### **Concentration:** *Master of Science in Robotics and Autonomous Systems (Artificial Intelligence)*

**College/School:** Ira A. Fulton Schools of Engineering

*Note: Program ownership is coded at the College/School level first and may not be a center, department or division apart from it.*

**Department/Division/School:** School of Computing, Informatics, and Decision Systems Engineering

**Proposing faculty group** (if applicable): ASU Robotics Faculty Group

---

#### **Concentration:** *Master of Science in Robotics and Autonomous Systems (Electrical Engineering)*

**College/School:** Ira A. Fulton Schools of Engineering

*Note: Program ownership is coded at the College/School level first and may not be a center, department or division apart from it.*

**Department/Division/School:** School of Electrical, Computer, and Energy Engineering

**Proposing faculty group** (if applicable): ASU Robotics Faculty Group

---

#### **Concentration:** *Master of Science in Robotics and Autonomous Systems (Mechanical and Aerospace Engineering)*

**College/School:** Ira A. Fulton Schools of Engineering

*Note: Program ownership is coded at the College/School level first and may not be a center, department or division apart from it.*

**Department/Division/School:** School for Engineering of Matter, Transport and Energy



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

**Proposing faculty group** (if applicable): ASU Robotics Faculty Group

---

**Concentration:** *Master of Science in Robotics and Autonomous Systems (Systems Engineering)*

**College/School:** Ira A. Fulton Schools of Engineering

*Note: Program ownership is coded at the College/School level first and may not be a center, department or division apart from it.*

**Department/Division/School:** The Polytechnic School

**Proposing faculty group** (if applicable): ASU Robotics Faculty Group

---

### 1. PURPOSE AND NATURE OF PROGRAM

#### A. Provide a brief program description:

Robotics and autonomous systems are interdisciplinary technologies that impact manufacturing, transportation, aerospace, defense, healthcare, etc. Robots take many different forms, but in general they are physical systems capable of carrying out a set of complex tasks, such as those required in a manufacturing assembly line. Good examples of autonomous systems are self-driving cars and auto-piloted flying drones. The 32-member ASU Robotics Faculty Group includes faculty from several engineering disciplines, and a large number of graduate robotics-related engineering courses are already being offered at both the Tempe and Polytechnic campuses. Autonomous systems and robotics are related, and extend the field of "traditional" robotics to emerging fields such as collective behavior, autonomous vehicles, advanced sensing technologies, etc. The proposed interdisciplinary MS degree will bring together students from various engineering backgrounds and allow them to take advantage of the broad variety of available courses and faculty.

Concentrations will be established under this program and applicants are required to select one of them:

- Artificial Intelligence
- Electrical Engineering
- Mechanical & Aerospace Engineering
- Systems Engineering

**B. Will concentrations be established under this degree program?** ☒ Yes ☐ No

(Please provide additional concentration information in the curricular structure section – number 7.)

### 2. PROGRAM NEED

Explain why the university should offer this program (include data and discussion of the target audience and market).

"Traditional" robotics, such as those used in manufacturing, are becoming ever-more widespread. The estimated number of robots in use in US factories was about 230,000 in 2014, making the US second only to Japan in the number of robots (Andel, T., 2014, "American Robot Market Sees Double-Digit Growth in 2014," Material Handling & Logistics, Oct 30, 2014). World-wide spending on robotics is widely projected to increase, such as at a compound annual growth rate (CAGR) of 9%, rising from \$11B in 2005 to \$67B in 2025 ("Robots: Building New Business Models," Siemens, April 20, 2016, <http://www.siemens.com/innovation/en/home/pictures-of-the-future/digitalization-and-software/autonomous-systems-facts-and-forecasts.html>, accessed Dec 15, 2016). An even more positive prediction of a CAGR of 17% has been made by IDC, leading to a forecast market of \$135B by 2019 ("The IDC FutureScape Report: Worldwide Robotics 2017 Predictions," IDC, Dec 13, 2016, <http://www.roboticstomorrow.com/article/2016/12/the-idc-futurescape-report-worldwide-robotics-2017-predictions/9247>,



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

accessed Dec 15, 2016). In the face of these rising expenditures on robotics, there is considerable debate over the impact of increasing robotics on future employment, but any job reductions will likely be concentrated in the low-skill occupations that robots will displace. On the contrary, there will be a continuing and increasing need for skilled interdisciplinary engineers to design, build, and program future robots. This same IDC report cited above states that "by 2020, robotics growth will accelerate the talent race, leaving 35% of robotics related jobs vacant while the average salary increases by at least 60%."

Similarly, there is a pressing need for skilled engineers in autonomous systems, which is perhaps best represented by autonomous ("self-driving") vehicles. There are well-known substantial investments in developing autonomous vehicles by Google, Tesla, Ford, General Motors, as well as by a number of start-up companies. A recent analysis of Indeed.com job postings for engineers with expertise in autonomous vehicles reveals a rapidly increasing availability of such positions (<http://spectrum.ieee.org/view-from-the-valley/at-work/tech-careers/where-are-the-jobs-for-autonomous-vehicle-engineers-gm-and-google-top-the-list>). An online educational start-up, Udacity, has already developed a "self-driving car engineer nanodegree" (<https://www.udacity.com/course/self-driving-car-engineer-nanodegree--nd013>), and reports that the average annual salary for engineers with such skills is \$138,000 (<http://fortune.com/2016/07/25/udacity-self-driving-car-school/>). Many other systems also benefit from increased automation, including aircraft (i.e., drones), spacecraft, buildings, and appliances.

At present, the only Arizona-based masters-level degree program in this field appears to be at Embry-Riddle Aeronautical University, which now offers an MS in Unmanned & Autonomous Systems Engineering which is targeted at aircraft.

### 3. IMPACT ON OTHER PROGRAMS

Attach any letters of collaboration or support from impacted programs (see checklist sheet). Please submit as a separate document.

At present no single existing program adequately prepares students interested in robotics and autonomous systems. The proposed MS in Robotics and Autonomous Systems represents a partnership between 4 of the 6 Schools within the Fulton Schools of Engineering (FSE): the School for Engineering of Matter, Transport & Energy (SEMTE), the Polytechnic School (POLY), the School of Computing, Informatics, and Decision Systems Engineering (SCIDSE), and the School of Electrical, Computer, and Energy Engineering (SECEE). Given the cross-disciplinary nature of the proposed degree, it will be housed administratively within the FSE Dean's Office. The Program Chair will be selected from the participating program faculty, and a committee will be formed of representatives from each of the 4 participating Schools to make admission, curriculum, and other decisions. Letters of collaboration from each of the 4 participating Schools are attached.

### 4. PROJECTED ENROLLMENT

How many new students do you anticipate enrolling in this program each year for the next five years?

*Note: The Arizona Board of Regents (ABOR) requires that nine master's degrees be awarded every three years. Thus, the projected enrollment numbers must account for this ABOR requirement.*

| 5-YEAR PROJECTED ANNUAL ENROLLMENT          |                      |   |   |  |   |
|---|----------------------|---|---|--|---|
| Please utilize the following tabular format | 1 <sup>st</sup> Year | 2 <sup>nd</sup> Year<br>(Yr. 1 continuing + new entering) | 3 <sup>rd</sup> Year<br>(Yr. 1 & 2 continuing + new entering) | 4 <sup>th</sup> Year<br>(Yrs. 1, 2, 3 continuing + new entering) | 5 <sup>th</sup> Year<br>(Yrs. 1, 2, 3, 4 continuing + new entering) |
| Number of Students Majoring (Headcount)     | 15                   | 35  | 50  | 60   | 60  |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### 5. ACCREDITATION OR LICENSING REQUIREMENTS (if applicable)

Provide the names of the external agencies for accreditation, professional licensing, etc. that guide your curriculum for this program, if any. Describe any requirements for accreditation or licensing.

None

### 6. STUDENT LEARNING OUTCOMES AND ASSESMENT

Attach a PDF copy of the assessment plan printed from the University Office of Evaluation and Educational Effectiveness assessment portal demonstrating UOEEE's approval of your assessment plan for this program. Visit the assessment portal at <https://uoeee.asu.edu/assessment-portal> or contact [uoeee@asu.edu](mailto:uoeee@asu.edu) with any questions.

### 7. CURRICULAR STRUCTURE

#### A. Curriculum Listing

| Standalone Parent Degree: Master of Science in Robotics and Autonomous Systems   |                                |             |              |
|--|--------------------------------|-------------|--------------|
| Required Core Courses for the Degree   |                                |             |              |
| Prefix and Number  | Course Title                   | New Course? | Credit Hours |
| MAE 501  | Linear Algebra in Engineering  | No          | 3            |
| MAE 547  | Modeling and Control of Robots | No          | 3            |
| Section sub-total:   |                                |             | 6            |
| Required Concentration Courses (if applicable)   |                                |             |              |
| Prefix and Number  | Course Title                   | New Course? | Credit Hours |
| Students will be required to select from one of the approved concentrations. See the concentration lists.  |                                |             | 6-12         |
| Section sub-total:   |                                |             | 6-12         |
| Elective or Research Courses<br>(as deemed necessary by supervisory committee)   |                                |             |              |
| Prefix and Number  | Course Title                   | New Course? | Credit Hours |
| Please see concentration tables for elective and research criteria.  |                                |             | 6-18         |
| Section sub-total:   |                                |             | 6-18         |
| Culminating Experience(s)<br><br>E.g. – Capstone course, portfolio, written comprehensive exam, applied project, thesis (must be 6 credit hours with oral defense)<br><br>Students will select the available options depending on their concentration. |                                |             | Credit Hours |
| Thesis (CSE 599, EGR 599, EEE 599 or MAE 599)  |                                |             | 6            |
| Applied Project (EGR 593 or MAE 593)   |                                |             | 3            |
| Written Comprehensive Exam   |                                |             | 0            |
| Portfolio  |                                |             | 0            |
| Section sub-total:   |                                |             | 0-6          |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

| Other Requirements<br><i>E.g. – internships, clinical requirements, field studies, foreign language exam as applicable</i> | Credit Hours |
|--|--------------|
| None   |              |
| Section sub-total:   |              |
| <b>Total required credit hours</b>   |              |

1. List all required core courses and total credit hours for the core (required courses other than internships, thesis, capstone course, etc.).
2. Omnibus numbered courses cannot be used as core courses.
3. Permanent numbers must be requested by submitting a course proposal to Curriculum ChangeMaker for approval.

| <b>Concentration: Master of Science in Robotics and Autonomous Systems (Artificial Intelligence)</b>  |   |             |              |
|---|---|-------------|--------------|
| <b>Required Core Courses for the Degree</b>   |   |             |              |
| Prefix and Number   | Course Title  | New Course? | Credit Hours |
| MAE 501   | Linear Algebra in Engineering                               | No          | 3            |
| MAE 547   | Modeling and Control of Robots                              | No          | 3            |
| Section sub-total:  |   |             | 6            |
| <b>Required Concentration Courses</b>   |   |             |              |
| Prefix and Number   | Course Title  | New Course? | Credit Hours |
| CSE 571   | Artificial Intelligence                                     | No          | 3            |
| Plus three of the following courses:  |   |             |              |
| CSE 591   | Topic: Advances in Robot Learning                           | No          | 3            |
| CSE 591   | Topic: Perception in Robotics                               | No          | 3            |
| IEE 598   | Topic: Optimal Foraging Theory: From Biology to Engineering | No          | 3            |
| CSE 522   | Real-Time Embedded Systems                                  | No          | 3            |
| CSE 551   | Foundations of Algorithms                                   | No          | 3            |
| CSE 574   | Planning and Learning Methods in AI                         | No          | 3            |
| CSE 575   | Statistical Machine Learning                                | No          | 3            |
| CSE 576   | Topics in Natural Language Processing                       | No          | 3            |
| CSE 591   | Topic: Human Aware Robotics                                 | No          | 3            |
| Section sub-total:  |   |             | 12           |
| <b>Elective or Research Courses</b><br>(as deemed necessary by supervisory committee)   |   |             |              |
| Prefix and Number   | Course Title  | New Course? | Credit Hours |
| Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be |   | -           | 6 to 12      |





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|  |  |                     |
|--|--|---------------------|
| graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee.   |  |                     |
| Section sub-total:   |  | 6 to12              |
| <b>Culminating Experience(s)</b><br><i>E.g. – Capstone course, portfolio, written comprehensive exam, applied project, thesis (must be 6 credit hours with oral defense)</i> |  | <b>Credit Hours</b> |
| CSE 599 Thesis   |  | 6                   |
| Portfolio  |  | 0                   |
| Section sub-total:   |  | 0-6                 |
| <b>Total required credit hours</b>   |  | <b>30</b>           |

|  |   |                     |                     |
|--|---|---------------------|---------------------|
| <b>Concentration: Master of Science in Robotics and Autonomous Systems (Electrical Engineering)</b>  |   |                     |                     |
| <b>Required Core Courses for the Degree</b>  |   |                     |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>                     | <b>New Course?</b>  | <b>Credit Hours</b> |
| MAE 501  | Linear Algebra in Engineering           | No                  | 3                   |
| MAE 547  | Modeling and Control of Robots          | No                  | 3                   |
| Section sub-total:   |   |                     | 6                   |
| <b>Required Concentration Courses</b>  |   |                     |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>                     | <b>New Course?</b>  | <b>Credit Hours</b> |
| EEE 582  | Linear System Theory                    | No                  | 3                   |
| EEE 588  | Design of Multivariable Control Systems | No                  | 3                   |
| Section sub-total:   |   |                     | 6                   |
| <b>Elective or Research Courses</b><br><i>(as deemed necessary by supervisory committee)</i>   |   |                     |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>                     | <b>New Course?</b>  | <b>Credit Hours</b> |
| Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives. |   | -                   | 12 to18             |
| Section sub-total:   |   |                     | 12 to18             |
| <b>Culminating Experience(s)</b><br><i>E.g. – Capstone course, portfolio, written comprehensive exam, applied project, thesis (must be 6 credit hours with oral defense)</i>   |   | <b>Credit Hours</b> |                     |
| EEE 599 Thesis   |   | 6                   |                     |
| Portfolio  |   | 0                   |                     |
| Written Comprehensive Exam   |   | 0                   |                     |
| Section sub-total:   |   |                     | 0-6                 |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|                                    |  |  |    |
|------------------------------------|--|--|----|
| <b>Total required credit hours</b> |  |  | 30 |
|------------------------------------|--|--|----|

  

|  |  |                    |                     |
|--|--|--------------------|---------------------|
| <b>Concentration: Master of Science in Robotics and Autonomous Systems (Mechanical and Aerospace Engineering)</b>  |  |                    |                     |
| <b>Required Core Courses for the Degree</b>  |  |                    |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>  | <b>New Course?</b> | <b>Credit Hours</b> |
| MAE 501  | Linear Algebra in Engineering                                    | No                 | 3                   |
| MAE 547  | Modeling and Control of Robots                                   | No                 | 3                   |
| Section sub-total:   |  |                    | 6                   |
| <b>Required Concentration Courses</b>  |  |                    |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>  | <b>New Course?</b> | <b>Credit Hours</b> |
| MAE 506  | Advanced System Modeling, Dynamics, and Control                  | No                 | 3                   |
| Plus one of the following courses:   |  |                    |                     |
| MAE 508  | Digital Control: Design and Implementation                       | No                 | 3                   |
| MAE 598  | Multi-Robot Systems  | No                 | 3                   |
| MAE 598  | Bio-Inspired Robots or LMI Methods in Optimal and Robust Control | No                 | 3                   |
| Section sub-total:   |  |                    | 6                   |
| <b>Elective or Research Courses</b><br>(as deemed necessary by supervisory committee)  |  |                    |                     |
| <b>Prefix and Number</b>   | <b>Course Title</b>  | <b>New Course?</b> | <b>Credit Hours</b> |
| Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives. |  | -                  | 12 to 18            |
| Section sub-total:   |  |                    | 12 to 18            |
| <b>Culminating Experience(s)</b><br><i>E.g. – Capstone course, portfolio, written comprehensive exam, applied project, thesis (must be 6 credit hours with oral defense)</i>   |  |                    | <b>Credit Hours</b> |
| MAE 599 Thesis   |  |                    | 6                   |
| MAE 593 Applied Project  |  |                    | 3                   |
| Portfolio  |  |                    | 0                   |
| Section sub-total:   |  |                    | 0-6                 |
| <b>Total required credit hours</b>   |  |                    | 30                  |

|  |
|--|
| <b>Concentration: Master of Science in Robotics and Autonomous Systems (Systems Engineering)</b> |
|--|





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

| Required Core Courses for the Degree   |  |             |              |
|--|--|-------------|--------------|
| Prefix and Number  | Course Title                           | New Course? | Credit Hours |
| MAE 501  | Linear Algebra in Engineering          | No          | 3            |
| MAE 547  | Modeling and Control of Robots         | No          | 3            |
| Section sub-total:   |  |             | 6            |
| Required Concentration Courses   |  |             |              |
| Prefix and Number  | Course Title                           | New Course? | Credit Hours |
| EGR 550  | Mechatronic Systems                    | Yes         | 3            |
| Plus one of the following courses:   |  |             |              |
| EGR 598  | Topic: Foldable Robots                 | No          | 3            |
| EGR 598  | Topic: Mechatronics Device Innovation  | No          | 3            |
| EGR 598  | Topic: System Control and Optimization | No          | 3            |
| PSY 560  | Advances in Theoretical Psychology     | No          | 3            |
| Section sub-total:   |  |             | 6            |
| Elective or Research Courses<br>(as deemed necessary by supervisory committee)   |  |             |              |
| Prefix and Number  | Course Title                           | New Course? | Credit Hours |
| Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives. |  | -           | 12 to18      |
| Section sub-total:   |  |             | 12 to18      |
| Culminating Experience(s)<br><i>E.g. – Capstone course, portfolio, written comprehensive exam, applied project, thesis (must be 6 credit hours with oral defense)</i>  |  |             | Credit Hours |
| EGR 599 Thesis   |  |             | 6            |
| EGR 593 Applied Project  |  |             | 3            |
| Portfolio  |  |             | 0            |
| Section sub-total:   |  |             | 0-6          |
| Total required credit hours  |  |             | 30           |

B. Will concentrations be established under this degree program? ☒ Yes ☐ No

i. If “Yes” is selected, please select the appropriate box:

- ☒ Students must select a concentration as part of this degree program  
☐ Concentrations are optional

ii. If “Yes” is selected, list the name of the concentrations and the minimum number of credit hours required for



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

each concentration.

| Concentration Name                   | Number of credit hours for courses specific to the concentration |
|--------------------------------------|--|
| Artificial Intelligence              | 12   |
| Electrical Engineering               | 6  |
| Mechanical and Aerospace Engineering | 6  |
| Systems Engineering                  | 6  |

### 8. COURSES

**A. Course Prefix(es):** Provide the following information for the proposed graduate program.

- i. Will a new course prefix(es) be required for this degree program?

Yes ☐ No ☒

If yes, complete the [Course Prefixes / Subjects Form](#) for each new prefix and submit it as part of this proposal submission. Form is located under the courses tab.

**B. New Courses Required for Proposed Degree Program:** Provide course prefix, number, title, credit hours and brief description for any new courses required for this degree program.

#### **EGR 550 Mechatronic Systems (3)**

This course provides an overview to the topic of robotic systems, from theory to practice. This course covers the topics of kinematics, design, mechatronics, controls, dynamics, and human systems interaction.

### 9. FACULTY, STAFF, AND RESOURCE REQUIREMENTS

#### **A. Faculty**

- i. **Current Faculty** – Complete the table below for all current faculty members who will teach in the program. If listing faculty from an academic unit outside of the one proposing the degree, please provide a support statement from that unit.

| Name              | Rank                | Highest Degree | Area of Specialization/Expertise    | Estimated Level of Involvement |
|-------------------|---------------------|----------------|-------------------------------------|--------------------------------|
| Panos Artemiadis  | Associate Professor | PhD            | Robotics/SEMTE                      | 25%                            |
| Heni Beni Amor    | Assistant Professor | PhD            | Artificial Intelligence/SCIDSE      | 25%                            |
| Thomas Sugar      | Professor           | PhD            | Robotics/POLY                       | 25%                            |
| Lina Karam        | Professor           | PhD            | Image Processing/ECEE               | 25%                            |
| Daniel Aukes      | Professor           | PhD            | Robotics Design/POLY                | 10%                            |
| Spring Berman     | Assistant Professor | PhD            | Multi-Robot Systems/SEMTE           | 10%                            |
| Georgios Fainekos | Assistant Professor | PhD            | Robotics & Unmanned Vehicles/SCIDSE | 10%                            |
| Armando Rodriguez | Professor           | PhD            | Control Systems/ECEE                | 10%                            |
| Wenlong Zhang     | Assistant Professor | PhD            | Cyberphysical Systems/POLY          | 10%                            |
| Hyunglae Lee      | Assistant Professor | PhD            | System Dynamics & Control/SEMTE     | 10%                            |
| Sangram Redkar    | Associate Professor | PhD            | Nonlinear Dynamics & Control/POLY   | 10%                            |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|                       |                     |     |   |     |
|-----------------------|---------------------|-----|---|-----|
| Angela Sodemann       | Assistant Professor | PhD | Artificial Intelligence & Machine Learning/POLY | 10% |
| Ted Pavlic            | Assistant Professor | PhD | Autonomous Decision-Making Systems/SCIDSE       | 10% |
| Yu (Tony) Zhang       | Assistant Professor | PhD | Multi-Agent Systems/SCIDSE                      | 10% |
| Panos Polygerinos     | Assistant Professor | PhD | Mechatronics/POLY                               | 10% |
| Yezhou Yang           | Assistant Professor | PhD | Cognitive Robotics/SCIDSE                       | 10% |
| Hamid Marvi           | Assistant Professor | PhD | Bio-Inspired Robotics/SEMTE                     | 10% |
| Matthew Peet          | Assistant Professor | PhD | Dynamic Systems & Control/SEMTE                 | 10% |
| Jennie Si             | Professor           | PhD | Dynamic Programming/ECEE                        | 10% |
| Konstantinos Tsakalis | Professor           | PhD | Control & Optimization/ECEE                     | 10% |

- ii. **New Faculty** - Describe the new faculty hiring needed during the next three years to sustain the program. List the anticipated hiring schedule and financial sources for supporting the addition of these faculty members. Any additional faculty needs will be met through the regular faculty hiring process in the four participating Schools.

None.

- iii. **Administration of the program** - Explain how the program will be administered for the purposes of admissions, advising, course offerings, etc. Discuss the available staff support.

The program will be housed administratively within the FSE Dean's Office, with the Graduate Program Chair (GPC) selected by the participating program faculty. A Graduate Program Committee will be composed of one representative each from POLY, SCIDSE, SECEE, & SEMTE, plus the GPC (nonvoting except to break a tie). The Graduate Program Committee will define admissions criteria and make admissions decisions, and make curriculum changes as needed with Graduate College review and approval. The FSE Associate Director of Fellowships, Doctoral Recruitment, & Assessment will coordinate the academic advisors from each of the four Schools to ensure consistency.

Applicants must select one of four concentrations: mechanical & aerospace engineering, systems engineering, electrical engineering, or artificial intelligence. Academic advising will be provided from the School most closely aligned with each concentration (SEMTE = mechanical & aerospace engineering, POLY = systems engineering, SECEE = electrical engineering, SCIDSE = artificial intelligence). The graduate support staff of each School will handle the paperwork for their respective concentrations including correspondence with prospective students, preparing applications for review by the Graduate Program Committee, corresponding with the Graduate College on admissions, filing programs of study, and reporting exam results.

- B. **Resource requirements needed to launch and sustain the program:** Describe any new resources required for this program's success such as new staff, new facilities, new library resources, new technology resources, etc.

New resources are not required to launch and sustain the program.



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX I

#### OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the [Graduate Programs Search](#)/catalog website.)

#### *Standalone Parent Degree: Master of Science in Robotics and Autonomous Systems*

1. **Proposed title of major:** Robotics and Autonomous Systems
2. **Provide a brief program description** (*Catalog type (i.e. will appear in Degree Search) – no more than 150 words. Do not include any admission or curriculum information*)

The Robotics and Autonomous Systems master's program is a multidisciplinary degree program emphasizing robotics, controls, autonomous systems, artificial intelligence, and related fields. Students must choose one of four concentrations: mechanical & aerospace engineering, systems engineering, electrical engineering, or artificial intelligence.

3. **Delivery/Campus Information Options:** On campus only (ground courses and iCourses).

4. **Campus(es) where program will be offered:**

ASU Online curriculum consists of courses that have no face-to-face content. iCourses are online courses for students in on-campus programs. iCourses may be included in a program, but may not comprise the entirety of a program. On-campus programs must have some face-to-face content.

*Note: Office of the Provost approval is needed for ASU Online delivery option.*

☐ ASU Online only (all courses online and managed by ASU Online)

**All other campus or location options (please select all that apply):**

☐ Downtown Phoenix ☒ Polytechnic ☒ Tempe ☐ West ☐ Other: \_\_\_\_\_

☐ **Both on-campus and** ☐ ASU Online\* - (check applicable campus(es) from options listed above)

*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in [Curriculum ChangeMaker](#) to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process.*

5. **Admission Requirements:**

Applicants must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree engineering, physics, or mathematics or related field, from a regionally accredited institution.

Applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.

#### **Applicants are required to submit:**

1. graduate admission application and application fee
2. official transcripts
3. proof of English proficiency
4. GRE scores
5. letter of intent/written statement
6. professional resume

#### **Additional Application Information**



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

An applicant whose native language is not English (regardless of current residency) must provide proof of English proficiency.

Applicants should apply directly to one of the available concentrations.

### 6. Application Review Terms (if applicable session):

Indicate the first term and year in which applications will be opened for admission. Applications will be accepted on a rolling basis after that time.

*Note: It is the academic unit's responsibility to display program deadline dates on their website.*

N/A. Students have to apply directly to one of the available concentrations at this time.

**Program admission deadlines website address:** <https://robotics.asu.edu/>

### 7. Curricular Requirements:

#### **Curricular Structure Breakdown for the Academic Catalog:**

*(To be completed by the Graduate College)*

30 credit hours and a thesis; or

30 credit hours including the required applied project course (EGR 593 or MAE 593); or

30 credit hours and a portfolio; or

30 credit hours and a written comprehensive exam

#### **Required Core (6 credit hours)**

MAE 501 Linear Algebra in Engineering (3)

MAE 547 Modeling and Control of Robots (3)

#### **Concentration (6-12 credit hours)**

#### **Electives or Research (6-18 credit hours)**

#### **Culminating Experience (0-6 credit hours)**

CSE 599 Thesis, or EGR 599 Thesis, or EEE 599 Thesis, or MAE 599 Thesis (6); or

EGR 593 Applied Project or MAE 593 Applied Project (3); or

Written Comprehensive Exam (0); or

Portfolio (0)

#### **Additional Curriculum Information**

Students will be required to select from one of the available concentrations and one of the approved culminating experiences for the concentration.

Please see the academic unit for available elective and research courses.

### 8. Comprehensive Exams:

**Master's Comprehensive Exam (when applicable), please select from the appropriate option.**

A written comprehensive exam is an option for the electrical engineering concentration.



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

9. Allow 400-level courses: ☐ Yes ☒ No

*Note: No more than 6 credit hours of 400-level coursework may be included on a graduate student plan of study.*

10. Committee:

Required number of thesis committee members (must be at least 3 including chair or co-chairs): 3

Required number of non-thesis option committee members (must be a minimum of one): 1

11. **Keywords:** List all keywords that could be used to search for this program. Keywords should be specific to the proposed program – limit 10 keywords.

robotics, autonomous systems, artificial intelligence, controls

12. Area(s) of Interest

A. Select **one (1)** primary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a>         | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                                    | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                                | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communication &amp; Media</a>               | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>                | <input type="checkbox"/> <a href="#">STEM</a>                           |
| <input checked="" type="checkbox"/> <a href="#">Engineering &amp; Technology</a> | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                        | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>                   | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                              |   |

B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a> | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                            | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                        | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communications &amp; Media</a>      | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>        | <input checked="" type="checkbox"/> <a href="#">STEM</a>                |
| <input type="checkbox"/> <a href="#">Engineering &amp; Technology</a>    | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>           | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                      |   |

13. Contact and Support Information:

|   |   |
|---|---|
| <b>Office Location - Building</b><br>Code & Room:<br>( <a href="#">Search ASU map</a> )                       | BYENG 691AA   |
| <b>Campus Telephone Number:</b><br>(may not be an individual's number)  | 480-727-1585  |
| <b>Program Email Address:</b><br>(may not be an individual's email)   | FultonSchools@asu.edu   |
| <b>Program Website Address:</b><br>(if one is not yet created, use unit website until one can be established) | <a href="https://graduate.engineering.asu.edu/graduate-programs/">https://graduate.engineering.asu.edu/graduate-programs/</a> |
| <b>Program Director (Name):</b>   | Patrick Phelan  |
| <b>Program Director (ASURITE):</b>  | pphelan   |
| <b>Program Support Staff (Name):</b>  | Sergio Quiros   |
| <b>Program Support Staff</b>  | szaid   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|                                      |               |
|--------------------------------------|---------------|
| <b>(ASURITE):</b>                    |               |
| <b>Admissions Contact (Name):</b>    | Sergio Quiros |
| <b>Admissions Contact (ASURITE):</b> | szaid         |

14. **Application and iPOS Recommendations:** List the Faculty and Staff who will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

| NAME           | ASURITE | ADMSN | POS |
|----------------|---------|-------|-----|
| Patrick Phelan | pphelan | X     | X   |
| Sergio Quiros  | szaid   | X     | X   |





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX I. A. OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the [Graduate Programs Search](#)/catalog website.)

**Concentration:** *Master of Science in Robotics and Autonomous Systems (Artificial Intelligence)*

1. **Proposed name of concentration:** Robotics and Autonomous Systems (Artificial Intelligence)
2. **Marketing description** *(Optional - 50 words maximum. The marketing description should not repeat content found in the program description.)*  
  
Advanced degree emphasizing competency in the rapidly growing fields of robotics and autonomous systems, with applications in artificial intelligence.
3. **Provide a brief program description** *(Catalog type (i.e. will appear in Degree Search) – no more than 150 words. Do not include any admission or curriculum information)*  
  
One of four concentrations in the multidisciplinary master of science in robotics and autonomous systems program emphasizing robotics, controls, autonomous systems, artificial intelligence, and related fields. This concentration is appropriate for students who wish to emphasize applications in artificial intelligence/computer science.
4. **Delivery/Campus Information Options:** On-campus only (ground courses and iCourses)
5. **Campus(es) where program will be offered:**

*ASU Online curriculum consists of courses that have no face-to-face content. iCourses are online courses for students in on-campus programs. iCourses may be included in a program, but may not comprise the entirety of a program. On-campus programs must have some face-to-face content*

*Note: Office of the Provost approval is needed for ASU Online campus options.*

☐ ASU Online only (all courses online and managed by ASU Online)

**All other campus or location options (please select all that apply):**

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: \_\_\_\_\_

☐ **Both** on-campus and ☐ ASU Online\* - (check applicable campus(es) from options listed above)

*\*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in Curriculum ChangeMaker to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process*

### 6. Admission Requirements

An applicant must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in engineering, science, mathematics or related field, from a regionally accredited institution.

Applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.

**Applicants are required to submit:**

1. graduate admission application and application fee
2. official transcripts



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

3. proof of English proficiency
4. GRE scores
5. letter of intent/written statement
6. professional resume

### Additional Application Information

Applicants whose native language is not English (regardless of current residency) must provide proof of English proficiency.

### 7. Application Review Terms (if applicable session):

| Terms  | Years                   | University Late Fee Deadline |
|--|-------------------------|------------------------------|
| <b>X</b> Fall (regular)<br>Session B                                   | (year): 2019<br>(year): | July 1st<br>October 1st      |
| <b>X</b> Spring (regular)<br>Session B                                 | (year): 2019<br>(year): | December 1st<br>February 8th |
| Summer (regular)<br>Summer B   | (year):<br>(year):      | May 14th<br>May 14th         |
| <i>Note: Session B is only available for approved online programs.</i> |                         |                              |

*It is the academic unit's responsibility to display program deadline dates on their website.*

**Program admission deadlines website address:** <https://robotics.asu.edu/>

### 8. Curricular Requirements:

**Curricular Structure Breakdown for the Academic Catalog:**  
(To be completed by the Graduate College)

30 credit hours and a thesis, or  
30 credit hours and a portfolio

#### **Required Core (6 credit hours)**

MAE 501 Linear Algebra in Engineering (3)  
MAE 547 Modeling and Control of Robots (3)

#### **Concentration (12 credit hours)**

#### **Electives or Research (6-12 credit hours)**

#### **Culminating Experience (0-6 credit hours)**

CSE 599 Thesis (6) or  
Portfolio (0)



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Additional Curriculum Information

Students will be required to select one of the approved culminating experiences for the concentration.

Please see the academic unit for the approved concentration coursework as well as the available elective and research courses. Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee.

A defense is required for the thesis option.

The portfolio is a compilation of three projects that are finished in the required concentration courses. Students must write a portfolio report that includes the highlights of the three projects.

**9. Allow 400-level courses:** ☒ Yes ☐ No

*Note: No more than six credit hours of 400-level coursework may be included on a graduate student plan of study.*

**10. Keywords:** List all keywords that could be used to search for this concentration. Keywords should be specific to the proposed concentration – limit 10 keywords.

robotics, autonomous systems, artificial intelligence, controls, engineering, AI

**11. Area(s) of Interest**

**A. Select one (1) primary area of interest from the list below that applies to this program.**

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a>         | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                                    | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                                | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communication &amp; Media</a>               | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>                | <input type="checkbox"/> <a href="#">STEM</a>                           |
| <input checked="" type="checkbox"/> <a href="#">Engineering &amp; Technology</a> | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                        | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>                   | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                              |   |

**B. Select one (1) secondary area of interest from the list below that applies to this program.**

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a> | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                            | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                        | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communications &amp; Media</a>      | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>        | <input checked="" type="checkbox"/> <a href="#">STEM</a>                |
| <input type="checkbox"/> <a href="#">Engineering &amp; Technology</a>    | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>           | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                      |   |

**12. Contact and Support Information:**

|   |           |
|---|-----------|
| <b>Office Location - Building</b><br>Code & Room:<br>( <a href="#">Search ASU map</a> ) | CTRPT 105 |
|---|-----------|



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|   |   |
|---|---|
| <b>Campus Telephone Number:</b><br>(may not be an individual's number)  | 480.965.3199  |
| <b>Program Email Address:</b><br>(may not be an individual's email)   | CIDSE.Advising@asu.edu  |
| <b>Program Website Address:</b><br>(if one is not yet created, use unit website until one can be established) | <a href="https://cidse.engineering.asu.edu/">https://cidse.engineering.asu.edu/</a> |
| <b>Program Director (Name):</b>   | Heni Beni Amor  |
| <b>Program Director (ASURITE):</b>  | hbenamor  |
| <b>Program Support Staff (Name):</b>  | Allison Curran  |
| <b>Program Support Staff (ASURITE):</b>   | alfarina  |

**13. Application and iPOS Recommendations:** List the Faculty and Staff that will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

| NAME           | ASURITE  | ADMSN | POS |
|----------------|----------|-------|-----|
| Allison Curran | alfarina | Y     | Y   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX I. B. OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the Graduate Programs Search/catalog website.)

*Concentration: Master of Science in Robotics and Autonomous Systems (Electrical Engineering)*

1. **Proposed name of concentration:** Robotics and Autonomous Systems (Electrical Engineering)
2. **Marketing description** *(Optional - 50 words maximum. The marketing description should not repeat content found in the program description.)*

Advanced degree emphasizing competency in the rapidly growing fields of robotics and autonomous systems, with applications in electrical engineering.

3. **Provide a brief program description** *(Catalog type (i.e. will appear in Degree Search) – no more than 150 words. Do not include any admission or curriculum information)*

One of four concentrations in the multidisciplinary Master of Science in Robotics & Autonomous Systems program emphasizing robotics, controls, autonomous systems, artificial intelligence, and related fields. This concentration is appropriate for students who wish to emphasize applications in electrical engineering.

4. **Delivery/Campus Information Options:** On-campus only (ground courses and iCourses)

5. **Campus(es) where program will be offered:**

ASU Online curriculum consists of courses that have no face-to-face content. iCourses are online courses for students in on-campus programs. iCourses may be included in a program, but may not comprise the entirety of a program. On-campus programs must have some face-to-face content

*Note: Office of the Provost approval is needed for ASU Online campus options.*

☐ ASU Online only (all courses online and managed by ASU Online)

**All other campus or location options (please select all that apply):**

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: \_\_\_\_\_

☐ **Both** on-campus and ☐ ASU Online\* - (check applicable campus(es) from options listed above)

*\*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in Curriculum ChangeMaker to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process*

6. **Admission Requirements**

An applicant must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in engineering, science, mathematics or related field, from a regionally accredited institution.

Applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.

**Applicants are required to submit:**

1. graduate admission application and application fee



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

2. official transcripts
3. proof of English proficiency
4. GRE scores
5. letter of intent/written statement
6. professional resume

### Additional Application Information

Applicants whose native language is not English (regardless of current residency) must provide proof of English proficiency.

### 7. Application Review Terms (if applicable session):

Indicate the first term and year in which applications will be opened for admission. Applications will be accepted on a rolling basis after that time.

*Note: It is the academic unit's responsibility to display program deadline dates on their website.*

| Terms  | Years                   | University Late Fee Deadline |
|--|-------------------------|------------------------------|
| <input checked="" type="checkbox"/> Fall (regular)<br><input type="checkbox"/> Session B   | (year): 2019<br>(year): | July 1st<br>October 1st      |
| <input checked="" type="checkbox"/> Spring (regular)<br><input type="checkbox"/> Session B | (year): 2019<br>(year): | December 1st<br>February 8th |
| <input type="checkbox"/> Summer (regular)<br><input type="checkbox"/> Summer B             | (year):<br>(year):      | May 14th<br>May 14th         |
| <i>Note: Session B is only available for approved online programs.</i>                     |                         |                              |

**Program admission deadlines website address:** <https://robotics.asu.edu/>

### 8. Curricular Requirements:

**Curricular Structure Breakdown for the Academic Catalog:**  
(To be completed by the Graduate College)

30 credit hours and a thesis, or  
30 credit hours and a portfolio, or  
30 credit hours and a written comprehensive exam

#### Required Core (6 credit hours)

MAE 501 Linear Algebra in Engineering (3)  
MAE 547 Modeling and Control of Robots (3)

#### Concentration (6)

#### Electives or Research (12-18 credit hours)

#### Culminating Experience (0-6 credit hours)

EEE 599 Thesis (6), or  
Written Comprehensive Exam (0), or  
Portfolio (0)

#### Additional Curriculum Information



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

Students will be required to select one of the approved culminating experiences for the concentration.

Please see the academic unit for the approved concentration coursework as well as the available elective and research courses. Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives.

A defense is required for the thesis option.

The portfolio includes a poster presentation with content from courses taken in the program. Students must write a portfolio report that includes the highlights of the three projects.

For students that select the comprehensive exam as the culminating experience, a written comprehensive exam is required. See the academic unit for additional information.

**9. Allow 400-level courses:** ☐ Yes ☒ No

*Note: No more than six credit hours of 400-level coursework may be included on a graduate student plan of study.*

**10. Keywords:** List all keywords that could be used to search for this concentration. Keywords should be specific to the proposed concentration – limit 10 keywords.

robotics, autonomous systems, artificial intelligence, controls, electrical, engineering, AI

**11. Area(s) of Interest**

**A. Select one (1) primary area of interest from the list below that applies to this program.**

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a>         | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                                    | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                                | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communication &amp; Media</a>               | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>                | <input type="checkbox"/> <a href="#">STEM</a>                           |
| <input checked="" type="checkbox"/> <a href="#">Engineering &amp; Technology</a> | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                        | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>                   | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                              |   |

**B. Select one (1) secondary area of interest from the list below that applies to this program.**

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a> | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                            | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                        | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communications &amp; Media</a>      | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>        | <input checked="" type="checkbox"/> <a href="#">STEM</a>                |
| <input type="checkbox"/> <a href="#">Engineering &amp; Technology</a>    | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>           | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                      |   |

**12. Contact and Support Information:**

|   |              |
|---|--------------|
| <b>Office Location - Building</b>           |              |
| <b>Code &amp; Room:</b><br>(Search ASU map) | GWC 209      |
| <b>Campus Telephone Number:</b>             | 480.965.3424 |





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|   |   |
|---|---|
| (may not be an individual's number)   |   |
| <b>Program Email Address:</b><br>(may not be an individual's email)   | AskEE@asu.edu   |
| <b>Program Website Address:</b><br>(if one is not yet created, use unit website until one can be established) | <a href="https://ecee.engineering.asu.edu/">https://ecee.engineering.asu.edu/</a> |
| <b>Program Director (Name):</b>   | Lina Karam  |
| <b>Program Director (ASURITE):</b>  | karam   |
| <b>Program Support Staff (Name):</b>  | Lauren Levin; Sno Kleespies; Toni Mengert; Lynn Pratte                            |
| <b>Program Support Staff (ASURITE):</b>   | lalevin; skleespi; tonic; lpratte   |
| <b>Admissions Contact (Name):</b>   | Lauren Levin; Sno Kleespies; Toni Mengert; Lynn Pratte                            |
| <b>Admissions Contact (ASURITE):</b>  | lalevin; skleespi; tonic; lpratte   |

**13. Application and iPOS Recommendations:** List the Faculty and Staff that will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

| NAME          | ASURITE  | ADMSN | POS |
|---------------|----------|-------|-----|
| Lauren Levin  | lalevin  | Y     | Y   |
| Sno Kleespies | skleespi | Y     | Y   |
| Toni Mengert  | tonic    | Y     | Y   |
| Lynn Pratte   | lpratte  | Y     | Y   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX I. C. OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the Graduate Programs Search/catalog website.)

**Concentration:** *Master of Science in Robotics and Autonomous Systems (Mechanical and Aerospace Engineering)*

- 1. Proposed name of concentration:** Robotics and Autonomous Systems (Mechanical and Aerospace Engineering)
- 2. Marketing description** *(Optional - 50 words maximum. The marketing description should not repeat content found in the program description.)*

Advanced degree emphasizing competency in the rapidly growing fields of robotics and autonomous systems, with applications in mechanical or aerospace engineering.

- 3. Provide a brief program description** *(Catalog type (i.e. will appear in Degree Search) – no more than 150 words. Do not include any admission or curriculum information)*

One of four concentrations in the multidisciplinary Master of Science in Robotics & Autonomous Systems program emphasizing robotics, controls, autonomous systems, artificial intelligence, and related fields. This concentration is appropriate for students who wish to emphasize applications in mechanical or aerospace engineering.

- 4. Delivery/Campus Information Options:** On-campus only (ground courses and iCourses)

- 5. Campus(es) where program will be offered:**

ASU Online curriculum consists of courses that have no face-to-face content. iCourses are online courses for students in on-campus programs. iCourses may be included in a program, but may not comprise the entirety of a program. On-campus programs must have some face-to-face content

*Note: Office of the Provost approval is needed for ASU Online campus options.*

☐ ASU Online only (all courses online and managed by ASU Online)

**All other campus or location options (please select all that apply):**

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: \_\_\_\_\_

☐ **Both on-campus and** ☐ ASU Online\* - (check applicable campus(es) from options listed above)

*\*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in Curriculum ChangeMaker to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process*

- 6. Admission Requirements**

An applicant must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in engineering, science, mathematics or related field, from a regionally accredited institution.

Applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Applicants are required to submit:

1. graduate admission application and application fee
2. official transcripts
3. proof of English proficiency
4. GRE scores
5. letter of intent/written statement
6. professional resume

### Additional Application Information

Applicants whose native language is not English (regardless of current residency) must provide proof of English proficiency.

### 7. Application Review Terms (if applicable session):

Indicate the first term and year in which applications will be opened for admission. Applications will be accepted on a rolling basis after that time.

*Note: It is the academic unit's responsibility to display program deadline dates on their website.*

| Terms  | Years                   | University Late Fee Deadline |
|--|-------------------------|------------------------------|
| <input checked="" type="checkbox"/> Fall (regular)<br><input type="checkbox"/> Session B   | (year): 2019<br>(year): | July 1st<br>October 1st      |
| <input checked="" type="checkbox"/> Spring (regular)<br><input type="checkbox"/> Session B | (year): 2019<br>(year): | December 1st<br>February 8th |
| <input type="checkbox"/> Summer (regular)<br><input type="checkbox"/> Summer B             | (year):<br>(year):      | May 14th<br>May 14th         |

*Note: Session B is only available for approved online programs.*

Program admission deadlines website address: <https://robotics.asu.edu/>

### 8. Curricular Requirements:

#### Curricular Structure Breakdown for the Academic Catalog:

*(To be completed by the Graduate College)*

30 credit hours and a thesis, or

30 credit hours including the required applied project course (MAE 593), or

30 credit hours and a portfolio

#### Required Core (6 credit hours)

MAE 501 Linear Algebra in Engineering (3)

MAE 547 Modeling and Control of Robots (3)

#### Concentration (6 credit hours)

#### Electives or Research (12-18 credit hours)

#### Culminating Experience (0-6 credit hours)

MAE 599 Thesis (6), or

MAE 593 Applied Project (3), or

Portfolio (0)



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Additional Curriculum Information

Students will be required to select one of the approved culminating experiences for the concentration.

Please see the academic unit for the approved concentration coursework as well as the available elective and research courses. Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives.

A defense is required for the thesis option.

The applied project requires a written report and an oral presentation.

The portfolio includes a poster presentation with content from courses taken in the program. Students must write a portfolio report that includes the highlights of the three projects.

9. Allow 400-level courses: ☐ Yes ☒ No

*Note: No more than six credit hours of 400-level coursework may be included on a graduate student plan of study.*

10. **Keywords:** List all keywords that could be used to search for this concentration. Keywords should be specific to the proposed concentration – limit 10 keywords.

robotics, autonomous systems, artificial intelligence, controls, mechanical, aerospace, engineering, AI

### 11. Area(s) of Interest

- A. Select **one (1)** primary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a>         | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                                    | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                                | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communication &amp; Media</a>               | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>                | <input type="checkbox"/> <a href="#">STEM</a>                           |
| <input checked="" type="checkbox"/> <a href="#">Engineering &amp; Technology</a> | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                        | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>                   | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                              |   |

- B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a> | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                            | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                        | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communications &amp; Media</a>      | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>        | <input checked="" type="checkbox"/> <a href="#">STEM</a>                |
| <input type="checkbox"/> <a href="#">Engineering &amp; Technology</a>    | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>           | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                      |   |

### 12. Contact and Support Information:

|  |         |
|--|---------|
| Office Location - Building<br>Code & Room: | ECG 207 |
|--|---------|



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|   |   |
|---|---|
| (Search ASU map)  |   |
| <b>Campus Telephone Number:</b><br>(may not be an individual's number)  | 480.965.4979  |
| <b>Program Email Address:</b><br>(may not be an individual's email)   | semtegrad@asu.edu   |
| <b>Program Website Address:</b><br>(if one is not yet created, use unit website until one can be established) | <a href="https://semte.engineering.asu.edu/">https://semte.engineering.asu.edu/</a> |
| <b>Program Director (Name):</b>   | Panos Artemiadis  |
| <b>Program Director (ASURITE):</b>  | partemia  |
| <b>Program Support Staff (Name):</b>  | Mia Kroeger   |
| <b>Program Support Staff (ASURITE):</b>   | mmkroege  |

**13. Application and iPOS Recommendations:** List the Faculty and Staff that will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

| NAME        | ASURITE  | ADMSN | POS |
|-------------|----------|-------|-----|
| Mia Kroeger | mmkroege | Y     | Y   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX I. D. OPERATIONAL INFORMATION FOR GRADUATE PROGRAMS

(This information is used to populate the Graduate Programs Search/catalog website.)

**Concentration:** *Master of Science in Robotics and Autonomous Systems (Systems Engineering)*

1. **Proposed name of concentration:** Robotics and Autonomous Systems (Systems Engineering)
2. **Marketing description** *(Optional - 50 words maximum. The marketing description should not repeat content found in the program description.)*  
  
Advanced degree emphasizing system-level competency in the rapidly growing fields of robotics and autonomous systems.
3. **Provide a brief program description** *(Catalog type (i.e. will appear in Degree Search) – no more than 150 words. Do not include any admission or curriculum information)*  
  
One of four concentrations in the multidisciplinary Master of Science in Robotics & Autonomous Systems program emphasizing robotics, controls, autonomous systems, artificial intelligence, and related fields. This concentration is appropriate for students who wish to emphasize applications in systems engineering.
4. **Delivery/Campus Information Options:** On-campus only (ground courses and iCourses)
5. **Campus(es) where program will be offered:**

*ASU Online curriculum consists of courses that have no face-to-face content. iCourses are online courses for students in on-campus programs. iCourses may be included in a program, but may not comprise the entirety of a program. On-campus programs must have some face-to-face content*

*Note: Office of the Provost approval is needed for ASU Online campus options.*

☐ ASU Online only (all courses online and managed by ASU Online)

**All other campus or location options (please select all that apply):**

☐ Downtown Phoenix   ☒ Polytechnic   ☐ Tempe   ☐ West   ☐ Other: \_\_\_\_\_

☐ **Both** on-campus and ☐ ASU Online\* - (check applicable campus(es) from options listed above)

*\*Note: Once students elect a campus or Online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please complete the ASU Online Offering form in [Curriculum ChangeMaker](#) to begin this request. Prior to completing the online Curriculum ChangeMaker form, please contact EdPlus at [asuonline@asu.edu](mailto:asuonline@asu.edu) who can provide you with additional information regarding the online request process*

#### 6. Admission Requirements

An applicant must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in engineering, science, mathematics or related field, from a regionally accredited institution.

Applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.00 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.

**Applicants are required to submit:**



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

1. graduate admission application and application fee
2. official transcripts
3. proof of English proficiency
4. GRE scores
5. letter of intent/written statement
6. professional resume

### Additional Application Information

Applicants whose native language is not English (regardless of current residency) must provide proof of English proficiency.

### 7. Application Review Terms (if applicable session):

Indicate the first term and year in which applications will be opened for admission. Applications will be accepted on a rolling basis after that time.

*Note: It is the academic unit's responsibility to display program deadline dates on their website.*

| Terms  | Years                   | University Late Fee Deadline |
|--|-------------------------|------------------------------|
| <input checked="" type="checkbox"/> Fall (regular)<br><input type="checkbox"/> Session B   | (year): 2019<br>(year): | July 1st<br>October 1st      |
| <input checked="" type="checkbox"/> Spring (regular)<br><input type="checkbox"/> Session B | (year): 2019<br>(year): | December 1st<br>February 8th |
| <input type="checkbox"/> Summer (regular)<br><input type="checkbox"/> Summer B             | (year):<br>(year):      | May 14th<br>May 14th         |
| <i>Note: Session B is only available for approved online programs.</i>                     |                         |                              |

Program admission deadlines website address: <https://robotics.asu.edu/>

### 8. Curricular Requirements:

#### Curricular Structure Breakdown for the Academic Catalog:

*(To be completed by the Graduate College)*

30 credit hours and a thesis, or  
30 credit hours including the required applied project course (EGR 593), or  
30 credit hours and a portfolio

#### Required Core (6 credit hours)

MAE 501 Linear Algebra in Engineering (3)  
MAE 547 Modeling and Control of Robots (3)

#### Concentration (6 credit hours)

#### Electives or Research (12-18 credit hours)

#### Culminating Experience (0-6 credit hours)

EGR 599 Thesis (6), or  
EGR 593 Applied Project (3), or  
Portfolio (0)





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Additional Curriculum Information

Students will be required to select one of the approved culminating experiences for the concentration.

Please see the academic unit for the approved concentration coursework as well as the available elective and research courses. Elective or research coursework must be selected from among the courses listed for the other three concentrations. Additional electives must be graduate courses in science, engineering, mathematics, or others approved by the Graduate Program Committee. Three credit hours of internship may be included among the electives.

A defense is required for the thesis option.

The applied project requires a written report and an oral presentation.

The portfolio includes a poster presentation with content from courses taken in the program. Students must write a portfolio report that includes the highlights of the three projects.

9. Allow 400-level courses: ☐ Yes ☒ No

*Note: No more than six credit hours of 400-level coursework may be included on a graduate student plan of study.*

10. **Keywords:** List all keywords that could be used to search for this concentration. Keywords should be specific to the proposed concentration – limit 10 keywords.

robotics, autonomous systems, artificial intelligence, controls, systems engineering

### 11. Area(s) of Interest

- A. Select **one (1)** primary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a>         | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                                    | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                                | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communication &amp; Media</a>               | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>                | <input type="checkbox"/> <a href="#">STEM</a>                           |
| <input checked="" type="checkbox"/> <a href="#">Engineering &amp; Technology</a> | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                        | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>                   | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                              |   |

- B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- |  |   |
|--|---|
| <input type="checkbox"/> <a href="#">Architecture &amp; Construction</a> | <input type="checkbox"/> <a href="#">Interdisciplinary Studies</a>      |
| <input type="checkbox"/> <a href="#">Arts</a>                            | <input type="checkbox"/> <a href="#">Law &amp; Justice</a>              |
| <input type="checkbox"/> <a href="#">Business</a>                        | <input type="checkbox"/> <a href="#">Mathematics</a>                    |
| <input type="checkbox"/> <a href="#">Communications &amp; Media</a>      | <input type="checkbox"/> <a href="#">Psychology</a>                     |
| <input type="checkbox"/> <a href="#">Education &amp; Teaching</a>        | <input checked="" type="checkbox"/> <a href="#">STEM</a>                |
| <input type="checkbox"/> <a href="#">Engineering &amp; Technology</a>    | <input type="checkbox"/> <a href="#">Science</a>                        |
| <input type="checkbox"/> <a href="#">Entrepreneurship</a>                | <input type="checkbox"/> <a href="#">Social and Behavioral Sciences</a> |
| <input type="checkbox"/> <a href="#">Health &amp; Wellness</a>           | <input type="checkbox"/> <a href="#">Sustainability</a>                 |
| <input type="checkbox"/> <a href="#">Humanities</a>                      |   |

### 12. Contact and Support Information:

|   |           |
|---|-----------|
| <b>Office Location</b> - Building<br>Code & Room:<br>(Search ASU map) | WANER 240 |
|---|-----------|



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

|   |   |
|---|---|
| <b>Campus Telephone Number:</b><br>(may not be an individual's number)  | 480-727-1874  |
| <b>Program Email Address:</b><br>(may not be an individual's email)   | polygrad@asu.edu  |
| <b>Program Website Address:</b><br>(if one is not yet created, use unit website until one can be established) | <a href="https://poly.engineering.asu.edu/">https://poly.engineering.asu.edu/</a> |
| <b>Program Director (Name):</b>   | Thomas Sugar  |
| <b>Program Director (ASURITE):</b>  | tsugar  |
| <b>Program Support Staff (Name):</b>  | Amy Wolsey  |
| <b>Program Support Staff (ASURITE):</b>   | awolsey   |
| <b>Admissions Contact (Name):</b>   | Amy Wolsey  |
| <b>Admissions Contact (ASURITE):</b>  | awolsey   |

- 13. Application and iPOS Recommendations:** List the Faculty and Staff that will input admission/POS recommendations to Gportal **and** indicate their approval for Admissions and/or POS:

| NAME         | ASURITE | ADMSN | POS |
|--------------|---------|-------|-----|
| Cindy Boglin | cwest   | Y     | Y   |
| Amy Wolsey   | awolsey | Y     | Y   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX II

#### Assessment Plans

*Standalone Parent Degree: Master of Science in Robotics and Autonomous Systems*



#### Academic Program Assessment Plan

|                       |  |   |
|-----------------------|--|---|
| <b>Date:</b> 4/6/2018 | <b>Program Name:</b> MS in Robotics and Autonomous Systems | <b>Status:</b> UOEEE Provisional Approval |
|-----------------------|--|---|

#### Comment

#### Assessment Plan

**Outcome 1:** Students completing the MS in Robotics and Autonomous Systems will be able to analyze and apply key theories and methods used in this field.

Measure 1.1 Students will be assessed on their ability to analyze and apply key theories and methods through appropriate questions on final exams of the core courses.

Performance Criterion 1.1 Satisfactory program performance is indicated when more than 80% of the students satisfactorily demonstrate this mastery on their examinations by receiving 80% or better on those questions.

Measure 1.2 Students will be employed in an area utilizing the knowledge acquired in the degree program and demonstrating analysis and application or higher-level capability.

Performance Criterion 1.2 Satisfactory program performance is indicated when more than 80% of the students completing the program are appropriately employed within two years of graduation in a position that requires analysis, application, synthesis, and/or evaluation of relevant theories and methods with a continuing appointment or satisfactory performance review.

Measure 1.3

Performance Criterion 1.3

**Outcome 2:** Students completing the MS in Robotics and Autonomous Systems will be able to evaluate and advance existing theories, methods, and designs in this field.

Measure 2.1 Regardless of the selected culminating experience (thesis, applied project, or portfolio), students will select a topic for research (thesis option), applied research (applied project option), or research concentration (portfolio option), and present a satisfactory proposal on that topic.

Performance Criterion 2.1 Satisfactory program performance is indicated when more than 80% of the students meet this outcome on the first attempt, as evaluated by the faculty advisor (thesis or applied project options) or Graduate Program Chair (portfolio option).

Measure 2.2 Regardless of the selected culminating experience (thesis, applied project, or portfolio), students will complete the research study as outlined in their proposal and document their results in a manner deemed acceptable for creativity and analysis by an appointed committee of program faculty.

Performance Criterion 2.2 Satisfactory program performance is indicated when more than 80% of the students meet this outcome within one year of developing the proposal.

Measure 2.3



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Performance Criterion 2.3

|                           |  |
|---------------------------|--|
| <b>Outcome 3:</b>         | Students completing the MS in Robotics and Autonomous Systems will be able to communicate their knowledge effectively through written and oral presentations.  |
| Measure 3.1               | Depending on the selected culminating experience, students will prepare a written thesis (thesis option), a project report (applied project option), or a poster (portfolio option) for presentation to a committee of knowledgeable researchers in the field.   |
| Performance Criterion 3.1 | Satisfactory performance is indicated when 80% or more of the students have their written thesis accepted by their examining committee (thesis option), their written report accepted by their examining committee (applied project option), or their poster accepted by an appointed committee of program faculty (portfolio option). |
| Measure 3.2               | Depending on the selected culminating experience, students will present an open oral defense (thesis option), an oral presentation with questions (applied project option), or a poster presentation that includes oral responses to questions (portfolio option).   |
| Performance Criterion 3.2 | Satisfactory performance is met when 80% or more of candidates pass this experience with only minor or major changes on the first attempt.   |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX II. A.

*Concentration: Master of Science in Robotics and Autonomous Systems (Artificial Intelligence)*



#### Academic Program Assessment Plan

|                           |   |               |  |         |                               |
|---------------------------|---|---------------|--|---------|-------------------------------|
| Date:                     | 1/30/2018   | Program Name: | MS in Robotics and Autonomous Systems<br>(Artificial Intelligence) | Status: | UOEEE Provisional<br>Approval |
| Comment                   | Many of the measures provided here would be better to separate into their individual measures. UOEEE is working on revising the website to allow more than three measures per outcomes. Once this has been completed, we will encourage this program to divide measures out appropriately.  |               |  |         |                               |
| Assessment Plan           |   |               |  |         |                               |
| Outcome 1:                | Students completing the MS in Robotics & Autonomous Systems will be able to apply concepts related to system dynamics, controls and artificial sensing and perception.  |               |  |         |                               |
| Measure 1.1               | For students selecting the option of thesis or applied project, the assessment measure will be to successfully defend their project that should involve analysis and application of at least two of the aforementioned key concepts before an appointed committee of program faculty. For students selecting the portfolio option, we will use a rubric to analyze the students' portfolio to demonstrate the students' mastery of at least two key concepts from the ones mentioned above. For students selecting the comprehensive exam option, the assessment measure will be a passing grade in the exam, which will include questions created by the program faculty related to at least two key concepts from the ones mentioned above. |               |  |         |                               |
| Performance Criterion 1.1 | At least 80% of the students will successfully defend their thesis, present their applied project, present their portfolio, or pass the comprehensive exam.   |               |  |         |                               |
| Measure 1.2               | Relevant employers will be surveyed to determine the ability of graduates, within 1 to 3 years of graduation, to apply concepts related to system dynamics, controls and artificial sensing and perception.   |               |  |         |                               |
| Performance Criterion 1.2 | At least 80% of the surveyed employers rate the performance of graduates as 'satisfactory' or better.   |               |  |         |                               |
| Measure 1.3               |   |               |  |         |                               |
| Performance Criterion 1.3 |   |               |  |         |                               |
| Outcome 2:                | Students completing the MS in Robotics & Autonomous Systems, AI Concentration, will be able to analyze and apply key artificial intelligence and machine learning theories and methods used in this field.  |               |  |         |                               |
| Measure 2.1               | The final project in the required concentration course CSE 571 Artificial Intelligence will be assessed via a rubric to demonstrate the students' ability to analyze and apply key artificial intelligence and machine learning theories and methods used in this field.  |               |  |         |                               |
| Performance Criterion 2.1 | At least 80% of the students will receive a grade of 'B' or better on the final project in CSE 571 Artificial Intelligence.   |               |  |         |                               |
| Measure 2.2               | Graduates will be employed in an area utilizing the knowledge and skills developed in the degree, or be accepted for further graduate study within one year of graduation.  |               |  |         |                               |
| Performance Criterion 2.2 | Based on the "First Destination Survey" administered by the ASU Alumni Foundation, at least 80% of the survey respondents will be employed in a related area, or pursuing further graduate study, within three years of graduation.   |               |  |         |                               |



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX II. B.

*Concentration: Master of Science in Robotics and Autonomous Systems (Electrical Engineering)*



#### Academic Program Assessment Plan

|                           |   |               |   |         |                               |
|---------------------------|---|---------------|---|---------|-------------------------------|
| Date:                     | 1/30/2018   | Program Name: | MS in Robotics and Autonomous Systems<br>(Electrical Engineering) | Status: | UOEEE Provisional<br>Approval |
| Comment                   | Many of the measures provided here would be better to separate into their individual measures. UOEEE is working on revising the website to allow more than three measures per outcomes. Once this has been completed, we will encourage this program to divide measures out appropriately.  |               |   |         |                               |
| Assessment Plan           |   |               |   |         |                               |
| Outcome 1:                | Students completing the MS in Robotics & Autonomous Systems will be able to apply concepts related to system dynamics, controls and artificial sensing and perception.  |               |   |         |                               |
| Measure 1.1               | For students selecting the option of thesis or applied project, the assessment measure will be to successfully defend their project that should involve analysis and application of at least two of the aforementioned key concepts before an appointed committee of program faculty. For students selecting the portfolio option, we will use a rubric to analyze the students' portfolio to demonstrate the students' mastery of at least two key concepts from the ones mentioned above. For students selecting the comprehensive exam option, the assessment measure will be a passing grade in the exam, which will include questions created by the program faculty related to at least two key concepts from the ones mentioned above. |               |   |         |                               |
| Performance Criterion 1.1 | At least 80% of the students will successfully defend their thesis, present their applied project, present their portfolio, or pass the comprehensive exam.   |               |   |         |                               |
| Measure 1.2               | Relevant employers will be surveyed to determine the ability of graduates, within 1 to 3 years of graduation, to apply concepts related to system dynamics, controls and artificial sensing and perception.   |               |   |         |                               |
| Performance Criterion 1.2 | At least 80% of the surveyed employers rate the performance of graduates as 'satisfactory' or better.   |               |   |         |                               |
| Measure 1.3               |   |               |   |         |                               |
| Performance Criterion 1.3 |   |               |   |         |                               |
| Outcome 2:                | Students completing the MS in Robotics & Autonomous Systems, EE Concentration, will be able to analyze and apply key sensing, signal processing, and control theories and methods used in this field.   |               |   |         |                               |
| Measure 2.1               | The final project in the required concentration course EEE 591 Real-Time DSP Systems will be assessed via a rubric to demonstrate the students' ability to analyze and apply key sensing, signal processing, and control theories and methods used in this field.   |               |   |         |                               |
| Performance Criterion 2.1 | At least 80% of the students will receive a grade of 'B' or better on the final project in EEE 591 Real-Time DSP Systems.   |               |   |         |                               |
| Measure 2.2               | Graduates will be employed in an area utilizing the knowledge and skills developed in the degree, or be accepted for further graduate study within one year of graduation.  |               |   |         |                               |
| Performance Criterion 2.2 | Based on the "First Destination Survey" administered by the ASU Alumni Foundation, at least 80% of the survey respondents will be employed in a related area, or pursuing further graduate study, within three years of graduation.   |               |   |         |                               |





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX II. C.

*Concentration: Master of Science in Robotics and Autonomous Systems (Mechanical and Aerospace Engineering)*



#### Academic Program Assessment Plan

|                           |   |               |   |         |                               |
|---------------------------|---|---------------|---|---------|-------------------------------|
| Date:                     | 1/30/2018   | Program Name: | MS in Robotics and Autonomous Systems<br>(Mechanical and Aerospace Engineering) | Status: | UOEEE Provisional<br>Approval |
| Comment                   | Many of the measures provided here would be better to separate into their individual measures. UOEEE is working on revising the website to allow more than three measures per outcomes. Once this has been completed, we will encourage this program to divide measures out appropriately.  |               |   |         |                               |
| Assessment Plan           |   |               |   |         |                               |
| Outcome 1:                | Students completing the MS in Robotics & Autonomous Systems will be able to apply concepts related to system dynamics, controls and artificial sensing and perception.  |               |   |         |                               |
| Measure 1.1               | For students selecting the option of thesis or applied project, the assessment measure will be to successfully defend their project that should involve analysis and application of at least two of the aforementioned key concepts before an appointed committee of program faculty. For students selecting the portfolio option, we will use a rubric to analyze the students' portfolio to demonstrate the students' mastery of at least two key concepts from the ones mentioned above. For students selecting the comprehensive exam option, the assessment measure will be a passing grade in the exam, which will include questions created by the program faculty related to at least two key concepts from the ones mentioned above. |               |   |         |                               |
| Performance Criterion 1.1 | At least 80% of the students will successfully defend their thesis, present their applied project, present their portfolio, or pass the comprehensive exam.   |               |   |         |                               |
| Measure 1.2               | Relevant employers will be surveyed to determine the ability of graduates, within 1 to 3 years of graduation, to apply concepts related to system dynamics, controls and artificial sensing and perception.   |               |   |         |                               |
| Performance Criterion 1.2 | At least 80% of the surveyed employers rate the performance of graduates as 'satisfactory' or better.   |               |   |         |                               |
| Measure 1.3               |   |               |   |         |                               |
| Performance Criterion 1.3 |   |               |   |         |                               |
| Outcome 2:                | Students completing the MS in Robotics & Autonomous Systems, MAE Concentration, will be able to analyze and apply theories on control, dynamics, sensor fusion and estimation theories used in this field. They will be also able to design, simulate and develop models and physical robotics autonomous systems.  |               |   |         |                               |
| Measure 2.1               | The final project in the required concentration course MAE 506 Advanced System Modeling, Dynamics and Controls will be assessed via a rubric to demonstrate the students' ability to analyze and apply theories on control, dynamics, sensor fusion and estimation theories used in this field.   |               |   |         |                               |
| Performance Criterion 2.1 | At least 80% of the students will receive a grade of 'B' or better on the final project in MAE 506 Advanced System Modeling, Dynamics and Controls.   |               |   |         |                               |
| Measure 2.2               | Graduates will be employed in an area utilizing the knowledge and skills developed in the degree, or be accepted for further graduate study within one year of graduation.  |               |   |         |                               |
| Performance Criterion 2.2 | Based on the "First Destination Survey" administered by the ASU Alumni Foundation, at least 80% of the survey respondents will be employed in a related area, or pursuing further graduate study, within three years of graduation.   |               |   |         |                               |





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### APPENDIX II. D.

*Concentration: Master of Science in Robotics and Autonomous Systems (Systems Engineering)*



#### Academic Program Assessment Plan

|                           |   |               |   |         |                            |
|---------------------------|---|---------------|---|---------|----------------------------|
| Date:                     | 1/30/2018   | Program Name: | MS in Robotics and Autonomous Systems (Systems Engineering) | Status: | UOEEO Provisional Approval |
| Comment                   | Many of the measures provided here would be better to separate into their individual measures. UOEEO is working on revising the website to allow more than three measures per outcomes. Once this has been completed, we will encourage this program to divide measures out appropriately.  |               |   |         |                            |
| Assessment Plan           |   |               |   |         |                            |
| Outcome 1:                | Students completing the MS in Robotics & Autonomous Systems will be able to apply concepts related to system dynamics, controls and artificial sensing and perception.  |               |   |         |                            |
| Measure 1.1               | For students selecting the option of thesis or applied project, the assessment measure will be to successfully defend their project that should involve analysis and application of at least two of the aforementioned key concepts before an appointed committee of program faculty. For students selecting the portfolio option, we will use a rubric to analyze the students' portfolio to demonstrate the students' mastery of at least two key concepts from the ones mentioned above. For students selecting the comprehensive exam option, the assessment measure will be a passing grade in the exam, which will include questions created by the program faculty related to at least two key concepts from the ones mentioned above. |               |   |         |                            |
| Performance Criterion 1.1 | At least 80% of the students will successfully defend their thesis, present their applied project, present their portfolio, or pass the comprehensive exam.   |               |   |         |                            |
| Measure 1.2               | Relevant employers will be surveyed to determine the ability of graduates, within 1 to 3 years of graduation, to apply concepts related to system dynamics, controls and artificial sensing and perception.   |               |   |         |                            |
| Performance Criterion 1.2 | At least 80% of the surveyed employers rate the performance of graduates as 'satisfactory' or better.   |               |   |         |                            |
| Measure 1.3               |   |               |   |         |                            |
| Performance Criterion 1.3 |   |               |   |         |                            |
| Outcome 2:                | Students completing the MS in Robotics & Autonomous Systems, Systems Concentration, will be able to analyze and apply theories used in the field to develop complex devices. They will be able to design, simulate, and create physical devices that apply sensing, control, dynamics, and modeling.  |               |   |         |                            |
| Measure 2.1               | The final project in the required concentration course EGR 550 Introduction to Robotic Systems will be assessed via a rubric to demonstrate the students' ability to design, simulate, and create physical devices that apply sensing, control, dynamics, and modeling.   |               |   |         |                            |
| Performance Criterion 2.1 | At least 80% of the students will receive a grade of 'B' or better on the final project in EGR 550 Robotic Systems.   |               |   |         |                            |
| Measure 2.2               | Graduates will be employed in an area utilizing the knowledge and skills developed in the degree, or be accepted for further graduate study within one year of graduation.  |               |   |         |                            |
| Performance Criterion 2.2 | Based on the "First Destination Survey" administered by the ASU Alumni Foundation, at least 80% of the survey respondents will be employed in a related area, or pursuing further graduate study, within three years of graduation.   |               |   |         |                            |



PROPOSAL TO ESTABLISH A NEW MASTER'S  
DEGREE PROGRAM

APPENDIX III

Support/Impact Statements

Ira A. Fulton Schools of Engineering – Official Submission

**From:** Sergio Quiros  
**Sent:** Monday, April 02, 2018 4:42 PM  
**To:** Curriculum Planning <[CurriculumPlanning@exchange.asu.edu](mailto:CurriculumPlanning@exchange.asu.edu)>  
**Cc:** Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>; Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>; Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>  
**Subject:** MS in Robotics & Autonomous Systems Concentrations

Hello,

Attached for your review are the following proposals:

**Ira A. Fulton Schools of Engineering**

*School of Computing, Informatics, & Decision Systems Engineering*

Establishment of a graduate concentration

[MS in Robotics & Autonomous Systems \(Artificial Intelligence\)](#)

**Ira A. Fulton Schools of Engineering**

*School of Electrical, Computer, & Energy Engineering*

Establishment of a graduate concentration

[MS in Robotics & Autonomous Systems \(Electrical Engineering\)](#)

**Ira A. Fulton Schools of Engineering**

*School for Engineering of Matter, Transport & Energy*

Establishment of a graduate concentration

[MS in Robotics & Autonomous Systems \(Mechanical & Aerospace Engineering\)](#)

**Ira A. Fulton Schools of Engineering**

*The Polytechnic School*

Establishment of a graduate concentration

[MS in Robotics & Autonomous Systems \(Systems Engineering\)](#)

Best,

*Sergio G. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770  
Email: [Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### School of Computing, Informatics, and Decision Systems Engineering – Support Statement

**From:** [Sandeep Gupta](#)  
**To:** [Patrick Phelan \(Professor\)](#)  
**Cc:** [Sergio Quiros](#); [Carrie Robinson](#); [Allison Curran](#); [Heni Ben Amor](#); [Chitta Baral \(chitta@asu.edu\)](#); [Araxi Hovhannessian](#); [Sandeep Gupta](#)  
**Subject:** RE: Seeking your approval for the revised artificial intelligence concentration proposal for the MS in Robotics & Autonomous Systems  
**Date:** Tuesday, March 06, 2018 5:41:36 PM  
**Attachments:** [image001.png](#)

---

Dear Pat,

I am glad to approve this proposal.

Thank you,  
Best regards and wishes,  
-sg

-----  
Sandeep Gupta, Professor, SCIDSE/ASU (<http://engineering.asu.edu/cidse>)  
Director, School of Computing, Informatics, and Decision Systems Engg. (CIDSE)  
Director, IMPACT Lab (<http://impact.asu.edu>)  
[sandeep.gupta@asu.edu](mailto:sandeep.gupta@asu.edu)



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### School of Electrical, Computer and Energy Engineering – Support Statement

**From:** [Stephen Phillips](#)  
**To:** [Patrick Phelan \(Professor\)](#)  
**Subject:** Re: Seeking your approval for the revised electrical engineering concentration proposal for the MS in Robotics & Autonomous Systems  
**Date:** Sunday, January 28, 2018 9:36:14 PM

---

Pat  
I approve.

Steve



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### School for Engineering of Matter, Transport and Energy – Support Statement

**From:** [Lenore Dai](#)  
**To:** [Patrick Phelan \(Professor\)](#)  
**Cc:** [Mia Kroeger](#); [Panagiotis Artemiadis](#); [Sergio Quiros](#); [Carrie Robinson](#); [Terry Alford](#); [Marc Mignolet](#)  
**Subject:** RE: Seeking your approval for the revised MAE concentration proposal for the MS in Robotics & Autonomous Systems  
**Date:** Monday, January 29, 2018 1:30:58 PM

---

Thanks, Pat and I approve.

Also, I would like to extend my sincere thanks to you, Panos, Marc, Mia and everyone!



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### The Polytechnic School– Support Statement

**From:** [Ann McKenna](#)  
**To:** [Patrick Phelan \(Professor\)](#); [Thomas Sugar](#); [Dan Aukes \(danaukes@asu.edu\)](#); [Arunachala Mada Kannan](#)  
**Cc:** [Sergio Quiros](#); [Carrie Robinson](#); [Cindy Boglin](#); [Bradley Rogers](#)  
**Subject:** Re: Seeking your approval for the revised systems engineering concentration proposal for the MS in Robotics & Autonomous Systems  
**Date:** Monday, January 29, 2018 7:52:48 PM

---

Hi Pat and Tom,

This looks like a great program and Poly concentration. Nice work on the proposal and I look forward to the launch in 2019.

Approved,  
Ann



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### College of Liberal Arts and Sciences – Impact Statement

**From:** Kenro Kusumi <[Kenro.Kusumi@asu.edu](mailto:Kenro.Kusumi@asu.edu)>  
**Date:** April 13, 2018 at 5:05:05 PM MST  
**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Cc:** "Patrick Phelan (Professor)" <[phelan@asu.edu](mailto:phelan@asu.edu)>, Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>, Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>, Jenny Smith <[jenny.smith@asu.edu](mailto:jenny.smith@asu.edu)>, Melanie Saridakis <[Melanie.Saridakis@asu.edu](mailto:Melanie.Saridakis@asu.edu)>  
**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Dear Sergio,

The Department of Physics and the School of Mathematical and Statistical Sciences (SoMSS) together with the College of Liberal Arts and Sciences have reviewed your planned master's programs and support their establishment. We think that these are very interesting programs that would not have significant impact on existing Physics or SoMSS programs. Some classes offered by SoMSS may be of interest to students in these new MS programs.

We wish you the best of luck in setting up these new concentrations.

Sincerely,  
Kenro Kusumi

--

**Kenro Kusumi**  
Associate Dean of Research and Graduate Initiatives  
Professor, School of Life Sciences  
**Arizona State University**  
**Office of the Dean**  
**College of Liberal Arts & Sciences**  
P.O. Box 876505  
300 E. University Ave., Suite 145  
Tempe, Arizona 85287-6505

**From:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Date:** Tuesday, April 10, 2018 at 10:25 AM  
**To:** Kenro Kusumi <[Kenro.Kusumi@asu.edu](mailto:Kenro.Kusumi@asu.edu)>, Melanie Saridakis <[Melanie.Saridakis@asu.edu](mailto:Melanie.Saridakis@asu.edu)>  
**Cc:** "Patrick Phelan (Professor)" <[phelan@asu.edu](mailto:phelan@asu.edu)>, Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>, Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>, Jenny Smith <[jenny.smith@asu.edu](mailto:jenny.smith@asu.edu)>  
**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Good Morning,

The Ira A. Fulton Schools of Engineering has received approval from the Office of the University Provost to proceed with the internal ASU proposal development and review process for the following graduate concentrations:

**Ira A. Fulton Schools of Engineering**  
*School of Computing, Informatics, & Decision Systems Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**





## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

*School of Electrical, Computer, & Energy Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Electrical Engineering)

**Ira A. Fulton Schools of Engineering**  
*School for Engineering of Matter, Transport & Energy*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

**Ira A. Fulton Schools of Engineering**  
*The Polytechnic School*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Systems Engineering)

Attached you will find the proposal for your review. The Graduate College has requested that we contact you to obtain a statement of support from your college.

We respectfully request your response by Friday, April 20<sup>th</sup> so that your response can be reviewed by the University Graduate Council (UGC) in the April meeting.

Best,

*Sergio G. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### College of Integrative Sciences and Arts – Impact Statement

**From:** [Duane Roen](#)  
**To:** [Sergio Quiros](#)  
**Cc:** [Patrick Phelan \(Professor\)](#); [Carrie Robinson](#); [Jeremy Helm](#); [Kelli Haren](#)  
**Subject:** RE: MS in Robotics & Autonomous Systems Concentrations  
**Date:** Tuesday, April 10, 2018 10:40:56 AM

---

Sergio, Patrick, Carrie, and Jeremy,

CISA is delighted to support your proposals for master's programs in robotics and autonomous systems concentrations.

How exciting!

Best,  
Duane

Duane Roen  
Vice Provost, Polytechnic campus  
Dean, College of Integrative Sciences and Arts  
Dean, University College  
**Arizona State University**  
Mail Code: 2780  
7271 E Sonoran Arroyo Mall  
Mesa, AZ 85212-6415



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### New College of Interdisciplinary Arts and Sciences – Impact Statement

**From:** Patricia Friedrich  
**Sent:** Tuesday, May 01, 2018 7:22 PM  
**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Cc:** Stacey Kimbell <[kimbell@asu.edu](mailto:kimbell@asu.edu)>  
**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Hi Sergio,

Thanks for checking back. Since MNS has no concerns, we have no concerns either and support the concentrations.

Thank you, Patty

Patricia Friedrich, PhD  
Associate Dean for Academic Programs,  
New College of Interdisciplinary Arts and Sciences  
Professor of Linguistics/Rhetoric and Composition,  
School of Humanities, Arts, and Cultural Studies  
Arizona State University P. O. Box 37100  
4701 W. Thunderbird Rd. Mail Code 3051  
Phoenix, AZ, USA 85069-7100

**From:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Date:** Tuesday, May 1, 2018 at 10:45 AM  
**To:** Patricia Friedrich <[Patricia.Friedrich@asu.edu](mailto:Patricia.Friedrich@asu.edu)>  
**Cc:** "Patrick Phelan (Professor)" <[phelan@asu.edu](mailto:phelan@asu.edu)>, Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>, Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>, Stacey Kimbell <[kimbell@asu.edu](mailto:kimbell@asu.edu)>, Lara Ferry <[Lara.Ferry@asu.edu](mailto:Lara.Ferry@asu.edu)>, Tosha Ruggles <[tosha.ruggles@asu.edu](mailto:tosha.ruggles@asu.edu)>  
**Subject:** RE: MS in Robotics & Autonomous Systems Concentrations

Hello Dr. Friedrich,

Sorry to bother you - the Graduate College is asking for a response from New College of Interdisciplinary Arts and Sciences before they allow the following proposals to move forward with the internal ASU development and review process.

**Ira A. Fulton Schools of Engineering**

*School of Computing, Informatics, & Decision Systems Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**

*School of Electrical, Computer, & Energy Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Electrical Engineering)



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Ira A. Fulton Schools of Engineering

*School for Engineering of Matter, Transport & Energy*

Establishment of a graduate concentration

MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

### Ira A. Fulton Schools of Engineering

*The Polytechnic School*

Establishment of a graduate concentration

MS in Robotics & Autonomous Systems (Systems Engineering)

Do you have any questions or concerns about the attached proposal? A simple reply to this email will suffice as a statement of support.

Thank you,

*Sergio G. Quiros*

Specialist Senior, Academic and Student Affairs

Ira A. Fulton Schools of Engineering

Arizona State University

Tempe, AZ 85287-8109

Phone: 480/727-5770

Email: [Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)

**From:** Lara Ferry

**Sent:** Tuesday, April 10, 2018 11:45 AM

**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>; Tosha Ruggles <[tosha.ruggles@asu.edu](mailto:tosha.ruggles@asu.edu)>; Patricia Friedrich <[Patricia.Friedrich@asu.edu](mailto:Patricia.Friedrich@asu.edu)>

**Cc:** Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>; Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>; Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>; Stacey Kimbell <[kimbell@asu.edu](mailto:kimbell@asu.edu)>

**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Sergio,

I believe you want to send this to Associate Dean, Patricia Friedrich. She is cc'ed

Patty, MNS has no concerns with these degrees.

Lara Ferry, PhD

Director and Professor, School of Mathematical & Natural Sciences

Honors Faculty, Barrett The Honors College

Sr. Sustainability Scholar, Julie Ann Wrigley Global Institute of Sustainability

Arizona State University

Mailing Address (letters): PO Box 37100, MC 2352 • Phoenix, AZ 85069-7100

Shipping Address (packages): 4701 W. Thunderbird Rd • Glendale, AZ 85306-4908

Office: CLCC 290

Research Website: <http://morphology.asu.edu>



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### Mary Lou Fulton Teacher's College – Impact Statement

**From:** Sherman Dorn  
**Sent:** Tuesday, April 10, 2018 11:03 AM  
**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Cc:** Melissa Rudd <[Melissa.Rudd@asu.edu](mailto:Melissa.Rudd@asu.edu)>  
**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Dear Sergio,

You have my support in my role as director of the Division of Educational Leadership and Innovation.

Sherman

Yours truly,

Sherman Dorn  
Professor and Division Director  
Division of Educational Leadership and Innovation  
Arizona State University | Mary Lou Fulton Teachers College  
P.O. Box 37100 | Phoenix, Arizona | 85069-7100 | Mail Code 3151  
Email: [sherman.dorn@asu.edu](mailto:sherman.dorn@asu.edu)

---

**From:** Sergio Quiros  
**Sent:** Tuesday, April 10, 2018 10:30:25 AM  
**To:** Sherman Dorn; Melissa Rudd  
**Cc:** Patrick Phelan (Professor); Carrie Robinson; Jeremy Helm; Erica Mitchell  
**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Good Morning,

The Ira A. Fulton Schools of Engineering has received approval from the Office of the University Provost to proceed with the internal ASU proposal development and review process for the following graduate concentrations:

**Ira A. Fulton Schools of Engineering**  
*School of Computing, Informatics, & Decision Systems Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**  
*School of Electrical, Computer, & Energy Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Electrical Engineering)

**Ira A. Fulton Schools of Engineering**  
*School for Engineering of Matter, Transport & Energy*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

**Ira A. Fulton Schools of Engineering**  
*The Polytechnic School*



**PROPOSAL TO ESTABLISH A NEW MASTER'S  
DEGREE PROGRAM**

Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Systems Engineering)

Attached you will find the proposal for your review. The Graduate College has requested that we contact you to obtain a statement of support from your college.

We respectfully request your response by Friday, April 20<sup>th</sup> so that your response can be reviewed by the University Graduate Council (UGC) in the April meeting.

Best,

*Sergio Z. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### College of Health Solutions – Impact Statement

**From:** Julie Liss  
**Sent:** Tuesday, April 10, 2018 11:07 AM  
**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Cc:** Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>; Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>; Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>; Kate Lehman <[KATE.LEHMAN@asu.edu](mailto:KATE.LEHMAN@asu.edu)>  
**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Hi Sergio,  
The College of Health Solutions supports your proposals listed below.  
Best wishes!  
Julie

**From:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>  
**Date:** Tuesday, April 10, 2018 at 10:37 AM  
**To:** Julie Liss <[JULIE.LISS@asu.edu](mailto:JULIE.LISS@asu.edu)>  
**Cc:** "Patrick Phelan (Professor)" <[phelan@asu.edu](mailto:phelan@asu.edu)>, Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>, Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>, Kate Lehman <[KATE.LEHMAN@asu.edu](mailto:KATE.LEHMAN@asu.edu)>  
**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Good Morning,

The Ira A. Fulton Schools of Engineering has received approval from the Office of the University Provost to proceed with the internal ASU proposal development and review process for the following graduate concentrations:

**Ira A. Fulton Schools of Engineering**  
*School of Computing, Informatics, & Decision Systems Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**  
*School of Electrical, Computer, & Energy Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Electrical Engineering)

**Ira A. Fulton Schools of Engineering**  
*School for Engineering of Matter, Transport & Energy*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

**Ira A. Fulton Schools of Engineering**  
*The Polytechnic School*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Systems Engineering)

Attached you will find the proposal for your review. The Graduate College has requested that we contact you to obtain a statement of support from your college.





**PROPOSAL TO ESTABLISH A NEW MASTER'S  
DEGREE PROGRAM**

We respectfully request your response by Friday, April 20<sup>th</sup> so that your response can be reviewed by the University Graduate Council (UGC) in the April meeting.

Best,

*Sergio Z. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### College of Nursing and Health Innovation – Impact Statement

**From:** Katherine Kenny  
**Sent:** Monday, May 07, 2018 12:16 PM  
**To:** Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>  
**Cc:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>; Nancy Kiernan <[nkiernan@asu.edu](mailto:nkiernan@asu.edu)>  
**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Dear Patrick – Thank you for sending this proposal for MS in Robotics and Autonomous Systems. I have reviewed this well written proposal. There is no conflict with the programs currently offered by the College of Nursing and Health Innovation (CONHI). On behalf of the College of Nursing and Health Innovation, I support moving this proposal forward. Good luck.

*Kathy*

Katherine (Kathy) Kenny, DNP, RN, ANP-BC, FAANP, FAAN  
Associate Dean of Academic Affairs  
College of Nursing and Health Innovation  
Arizona State University

**From:** Sergio Quiros  
**Sent:** Monday, May 07, 2018 10:49 AM  
**To:** Katherine Kenny <[Katherine.Kenny@asu.edu](mailto:Katherine.Kenny@asu.edu)>  
**Cc:** Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>; Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>; Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>; Nancy Kiernan <[nkiernan@asu.edu](mailto:nkiernan@asu.edu)>  
**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Good Morning,

The Ira A. Fulton Schools of Engineering has received approval from the Office of the University Provost to proceed with the internal ASU proposal development and review process for the following graduate concentrations:

**Ira A. Fulton Schools of Engineering**

*School of Computing, Informatics, & Decision Systems Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**

*School of Electrical, Computer, & Energy Engineering*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Electrical Engineering)

**Ira A. Fulton Schools of Engineering**

*School for Engineering of Matter, Transport & Energy*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

**Ira A. Fulton Schools of Engineering**

*The Polytechnic School*  
Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Systems Engineering)



**PROPOSAL TO ESTABLISH A NEW MASTER'S  
DEGREE PROGRAM**

Attached you will find the proposal for your review. The Graduate College has requested that we contact you to obtain a statement of support from your college.

Best,

*Sergio Z. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### W. P. Carey School of Business – Impact Statement

**From:** Kay Faris  
**Sent:** Wednesday, April 18, 2018 6:17 AM  
**To:** Sergio Quiros <Sergio.Quiros@asu.edu>  
**Cc:** Patrick Phelan (Professor) <phelan@asu.edu>; Carrie Robinson <Carrie.Robinson@asu.edu>; Kim Naig <Kim.Naig@asu.edu>; Brian Mattson <Brian.Mattson@asu.edu>; Amanda Morales-Calderon <AMANDA.MORALES-CALDERON@asu.edu>; Erin Froncek <Erin.Froncek@asu.edu>; Chasaty Smith <Chasaty.Smith@asu.edu>; Tamara Underiner <Tamara.Underiner@asu.edu>; Kay Faris <KAY.FARIS@asu.edu>  
**Subject:** RE: MS in Robotics & Autonomous Systems Concentrations

Good Morning, Sergio,

The W. P. Carey School of Business has no concerns with the MS in Robotics and Autonomous Systems Concentrations. We see no overlap in our curriculum.

Please let me know if you have any additional questions.

Thanks,

Kay

Kay A. Faris  
Senior Associate Dean, Academic Programs  
W. P. Carey School of Business  
Arizona State University  
Tempe, AZ 85287-3406  
[Kay.Faris@asu.edu](mailto:Kay.Faris@asu.edu)



Where Business is Personal®



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### School for the Future of Innovation in Society – Impact Statement

**From:** David Guston

**Sent:** Saturday, May 05, 2018 1:40 PM

**To:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>

**Cc:** Andra Williams <[Andra.Williams@asu.edu](mailto:Andra.Williams@asu.edu)>; Patrick Phelan (Professor) <[phelan@asu.edu](mailto:phelan@asu.edu)>; Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>; Kim Naig <[Kim.Naig@asu.edu](mailto:Kim.Naig@asu.edu)>; Brian Mattson <[Brian.Mattson@asu.edu](mailto:Brian.Mattson@asu.edu)>; Amanda Morales-Calderon <[AMANDA.MORALES-CALDERON@asu.edu](mailto:AMANDA.MORALES-CALDERON@asu.edu)>; Erin Froncek <[Erin.Froncek@asu.edu](mailto:Erin.Froncek@asu.edu)>; Chasaty Smith <[Chasaty.Smith@asu.edu](mailto:Chasaty.Smith@asu.edu)>; Tamara Underiner <[Tamara.Underiner@asu.edu](mailto:Tamara.Underiner@asu.edu)>; Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>; Jason Bobis <[jbobis@asu.edu](mailto:jbobis@asu.edu)>

**Subject:** Re: MS in Robotics & Autonomous Systems Concentrations

Sergio

The graduate concentrations below seem to be wonderful additions to your programs. They have my full support.

Dave

**From:** Sergio Quiros <[Sergio.Quiros@asu.edu](mailto:Sergio.Quiros@asu.edu)>

**Date:** Tuesday, May 1, 2018 at 11:31 AM

**To:** David Guston <[David.Guston@asu.edu](mailto:David.Guston@asu.edu)>

**Cc:** Andra Williams <[Andra.Williams@asu.edu](mailto:Andra.Williams@asu.edu)>, "Patrick Phelan (Professor)" <[phelan@asu.edu](mailto:phelan@asu.edu)>, Carrie Robinson <[Carrie.Robinson@asu.edu](mailto:Carrie.Robinson@asu.edu)>, Kim Naig <[Kim.Naig@asu.edu](mailto:Kim.Naig@asu.edu)>, Brian Mattson <[Brian.Mattson@asu.edu](mailto:Brian.Mattson@asu.edu)>, Amanda Morales-Calderon <[AMANDA.MORALES-CALDERON@asu.edu](mailto:AMANDA.MORALES-CALDERON@asu.edu)>, Erin Froncek <[Erin.Froncek@asu.edu](mailto:Erin.Froncek@asu.edu)>, Chasaty Smith <[Chasaty.Smith@asu.edu](mailto:Chasaty.Smith@asu.edu)>, Tamara Underiner <[Tamara.Underiner@asu.edu](mailto:Tamara.Underiner@asu.edu)>, Jeremy Helm <[JEREMY.HELM@asu.edu](mailto:JEREMY.HELM@asu.edu)>, Jason Bobis <[jbobis@asu.edu](mailto:jbobis@asu.edu)>

**Subject:** FW: MS in Robotics & Autonomous Systems Concentrations

Hello Dr. Guston,

The Ira A. Fulton Schools of Engineering has received approval from the Office of the University Provost to proceed with the internal ASU proposal development and review process for the following graduate concentrations:

**Ira A. Fulton Schools of Engineering**

*School of Computing, Informatics, & Decision Systems Engineering*

Establishment of a graduate concentration

MS in Robotics & Autonomous Systems (Artificial Intelligence)

**Ira A. Fulton Schools of Engineering**

*School of Electrical, Computer, & Energy Engineering*

Establishment of a graduate concentration

MS in Robotics & Autonomous Systems (Electrical Engineering)

**Ira A. Fulton Schools of Engineering**

*School for Engineering of Matter, Transport & Energy*



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Mechanical & Aerospace Engineering)

**Ira A. Fulton Schools of Engineering**

*The Polytechnic School*

Establishment of a graduate concentration  
MS in Robotics & Autonomous Systems (Systems Engineering)

Attached you will find the proposal for your review. The Graduate College has requested that we contact you to obtain a statement of support from your School. A simple response to this email will suffice as a statement of support.

Best,

*Sergio Z. Quiros*

Specialist Senior, Academic and Student Affairs  
Ira A. Fulton Schools of Engineering  
Arizona State University  
Tempe, AZ 85287-8109  
Phone: 480/727-5770



## PROPOSAL TO ESTABLISH A NEW MASTER'S DEGREE PROGRAM

### (NEW GRADUATE INITIATIVES)

### PROPOSAL PROCEDURES CHECKLIST

Academic units should adhere to the following procedures when requesting new curricular initiatives (degrees, concentrations or certificates).

- ☐ **Obtain the required approval from the Office of the Provost to move the initiative forward for internal ASU governance reviews/approvals.** Please see the academic strategic plan website at: <https://provost.asu.edu/curriculum-development>.
- ☐ **Submit any new courses that will be required for the new curricular program to the Curriculum ChangeMaker online course approval system for review and approval.**
  - Additional information can be found at the Provost's Office Curriculum Development website: [Courses link](#)
  - For questions regarding proposing new courses, send an email to: [courses@asu.edu](mailto:courses@asu.edu)
- ☐ **Prepare the applicable proposal template and operational appendix for the proposed initiative.**
- ☐ **Obtain letters or memos of support or collaboration (if applicable).**
  - when resources (faculty or courses) from another academic unit will be utilized
  - when other academic units or degree programs may be impacted by the proposed request
  - if the program will have an online delivery option support will be required from the Provost's office and ASU Online. *(Please complete the ASU Online Offering form in [Curriculum ChangeMaker](#) to begin this request.)*
- ☐ **Obtain the internal reviews/approvals of the academic unit.**
  - internal faculty governance review committee(s)
  - academic unit head (e.g. Department Chair or School Director)
  - academic unit Dean or their designee (will submit approved proposal to the [curriculumplanning@asu.edu](mailto:curriculumplanning@asu.edu) email account for further ASU internal governance reviews (as applicable, University Graduate Council, CAPC and Senate)

### **Additional Recommendations**

All new graduate programs require specific processes and procedures to maintain a successful degree program. Below are items that the Graduate College strongly recommends that academic units establish after the program is approved for implementation.

- ☐ **Establish satisfactory academic progress policies, processes and guidelines** – Check within the proposing academic unit and/or college to see if there are existing academic progress policies and processes in place. If none have been established, please go to [http://graduate.asu.edu/faculty\\_staff/policies](http://graduate.asu.edu/faculty_staff/policies) and scroll down to the **academic progress review and remediation processes** (for faculty and staff) section to locate the reference tool and samples for establishing these procedures.
- ☐ **Establish a Graduate Student Handbook for the new degree program** – Students need to know the specific requirements and milestones they must meet throughout their degree program. A Graduate Student Handbook, provided to students when they are admitted to the degree program and published on the website for the new degree, gives students this information. To be included in the handbook are the unit/college satisfactory academic progress policies, current degree program requirements (outlined in the approved proposal) and a link to the Graduate Policies and Procedures website: [http://graduate.asu.edu/faculty\\_staff/policies](http://graduate.asu.edu/faculty_staff/policies).