# ESTABLISHING GRADUATE CERTIFICATES
ARIZONA STATE UNIVERSITY
**GRADUATE EDUCATION**

**This form should be used by programs seeking to establish a new graduate certificate. All sections should be completed.**

The graduate certificate is a programmatic or linked series of courses in a single field or in one that crosses disciplinary boundaries. The graduate certificate facilitates professional growth for people who already hold the baccalaureate degree, and it may be freestanding or linked to a degree program. The graduate certificate enables the university to respond to societal needs while promoting university cooperation with corporate, industrial, and professional communities.

Submit the completed and signed (chairs, unit deans) proposal to the **Office of Graduate Academic Programs** in Graduate Education. Mail code: 1003 and electronic copies to eric.wertheimer@asu.edu or amanda.morales-calderon@asu.edu.

**Please type.**

| | |
|---|---|
| **Contact Name(s):** Stephen I Helms Tillery | **Contact Phone(s):** 480-965-6010 |
| **College:** Fulton Schools of Engineering (FSE) | |
| **Department/School:** School of Biological & Health Systems Engineering (SBHSE) | |
| **Name of proposed Certificate:** Neural Engineering | |
| **Requested Effective Term and Year:** Spring, 2015<br>(*e.g. Fall 2014*) | |
| **Do Not Fill in this information: Office Use Only**<br>**CIP Code:** | |

**1. OVERVIEW.** Below, please provide a brief overview of the certificate, including the rationale and need for the program, potential size and nature of the target audience, information on comparable programs (at ASU and/or peer institutions), how this program would relate to existing programs at ASU, and any additional appropriate information.

Technologies for ameliorating neural disorders ranging from epilepsy and stroke to paralysis are developing rapidly. Understanding and deploying these technologies will require specialized skills in neurophysiology, bioelectricity, and neural-electronic interfaces. The new "Graduate Certificate in Neural Engineering" will prepare clinical, industrial, and academic practitioners with those skills through a set of five online courses delivered through FSE's Office of Global Outreach and Extended Education (GOEE), aligned with existing courses in the graduate curriculum of Biomedical Engineering (BME). We will recruit from regional clinical and industrial partners as well as existing graduate students. Students who complete this program will be well-positioned to participate in the rapidly growing fields of neural prosthetics and neural engineering as a professional, or to move directly into our MS or PhD programs in Biomedical Engineering. Finally, the creation of this certificate program is part of building our overall MS program: it allows us to have a dedicated curriculum that is available to all of our graduate students, it frees faculty to continue developing specialized courses for the PhD program, and we anticipate this program generating additional resources that will benefit our overall program of graduate education.

We will recruit from regional clinical and industrial partners as well as existing graduate students. We have already begun discussions with individuals involved in training medical professionals at Phoenix Children's Hospital, St. Joseph's Hospital, and Maricopa Integrated System about identifying medical residents who would be interested in graduate training to accompany their clinical training. We anticipate drawing a portion of our initial cohort from this setting. In addition, we have had preliminary conversations with some of our industrial partners who serve our students by providing internships. We plan to add the industrial partners in the recruitment for our second cohort of students. Finally, SBHSE has been building relationships with international partners in China, Taiwan, Vietnam, and Mexico, and we anticipate delivery of the online program to students associated with those partnerships beginning in our third year.

In year three we expect 20-30 students to be enrolled in this program. This will be a key part of growing our overall MS program. With a current enrollment of 800 undergraduates and 150 graduate students, our 23 tenure/tenure-

track faculty and 2 lecturers are operating at near capacity for delivery of material. We would like to expand from our current load of nearly 100 MS students to an overall load of 200 MS students, and having online delivery of several courses will be a key element in making that possible without compromising the educational experience of either our undergraduates or our PhD students.

At the present time, there are no comparable certificate programs at ASU. Students in M.S. programs in BME, or the programs housed in SoLS (biology), CLAS (neuroscience) or FSOE (electrical engineering) can receive some of the elements of this training, but none are similar in content or intent to the proposed Graduate Certificate in Neural Engineering.

To the best of our knowledge, this certificate will be the first of its kind. We have identified many programs which offer "Neural Engineering" as a track in BME graduate programs, and many programs which offer graduate certificates in Biomedical Engineering, but have not found programs specifically offering a Graduate Certificate in Neural Engineering

Finally, students who successfully complete this certificate program will be well-positioned to compete for positions in doctoral programs like ASU's BME and Biological Design graduate programs.

## 2. ADMINISTRATION AND RESOURCES

**A.** How will the proposed certificate be administered (including recommendations for admissions, student advisement, retention etc.)? Describe the administering body in detail, especially if the proposed certificate is part of a larger interdisciplinary agenda. How will the graduate support staffing needs for this proposed certificate program be met?

In its initial years, this program will be administered through the same structure as the existing M.S. and Ph.D. programs in Biomedical Engineering (BME) in FSE. In addition to the Graduate Program Chair, these programs have 1.75 staff tasked with advising our 150 BME graduate students in terms of class choice, iPOS submission, and other logistic details of the programs. In the initial three years of this certificate program, we will be limiting enrollment to a maximum of 30 students total (10 admissions per year) to gain an understanding of how much time is required to provide appropriate guidance to these students. We do anticipate eventually requiring additional staffing, as the long-term plan will be to allow substantial grow.

In the first years, admissions will be managed by the Graduate Committee in discussion with the advising staff. Advising staff will be responsible for an initial triage of applicants to the program in consultation with the Graduate Program Chair. Students who meet the initial bar will be evaluated, rated, and ranked by the 5-member Graduate Committee. A final selection of applicants will then be offered admission to the program. Admissions will be managed in a rolling fashion. For example, in year one we will accept up to 10 students: we will admit qualified students until we reach that number. This is the same procedure which we follow for applicants to the graduate programs in Biomedical Engineering, and it has served us well to date.

Advisement will be managed under the same advising structure as our BME program. Our current staffing, responsible for advising students from M.S. and Ph.D. programs in BME as well as Ph.D. students in Biological Design leaves us with some excess advising capacity. We will take up a portion of that capacity for students in this certificate program, and do not anticipate any serious problems in handling the additional capacity as the advising will be a subset of that for our current M.S. students.

Finally, our advising staff has developed strategies such as contact intervals for our current students that manages retention with great effectiveness. Since this is a new program, the Program Chair will set aside time for routine contact with the cohorts of students, including individualized emails, and town-hall style online meetings.

**B.** What are the resource implications for the proposed certificate, including projected budget needs? Will new books, library holdings, equipment, laboratory space and/or personnel be required now or in the future? If multiple units/programs will collaborate in offering this certificate, please discuss the resource contribution of each participating program. Letters of support must be included from all academic units that will commit resources to this certificate program.

The key resource that will be necessary for the delivery of this program is the availability of several of our graduate courses in an online format. We have begun the process of creating online versions of two courses for this program in cooperation with Fulton's Global Outreach & Extended Education's ASU Engineering Online program. We will continue to require these resources in the development and administration of the program.

As this program grows, we do anticipate growth being required in administrative support as well as continued assistance with delivery of online materials, but at this stage do not anticipate any additional resources to create and manage this program.

## 3. ADMISSIONS PROCEDURES AND CRITERIA

**A. Admission criteria** – Applicants must meet the admissions criteria for Graduate Education. Please also include any other additional admission requirements, e.g. type of undergraduate degree, minimum GPA, tests and/or entry-level skills that are required for this certificate program. (http://graduate.asu.edu/sites/default/files/GraduatePolicies_1.pdf)

**Degree(s):**

B.S. or B.S.E. in Biomedical engineering, OR
B.S. or B.S.E. in engineering + advanced (post-baccalaureate) training in medicine, physiology, or related fields,

OR

B.S. in science discipline, plus additional background work in thermodynamics, fluids, transport AND additional work in medicine, physiology, or related fields. Specifically, applicants will need to demonstrate equivalent proficiency in at least 4 of the following 6 areas:

Thermodynamics or Physical Chemistry

Fluid Mechanics or Engineering Transport

Engineering Mechanics

Electrical Networks or Circuits

Signals and systems or Control systems

Biomaterials

**GPA:** Minimum of a 3.00 cumulative GPA (scale is 4.0=A) in the last 60 hours of a student's first bachelor's degree program. Minimum of 3.00 cumulative GPA (scale is 4.0 = A) in the applicable Master's degree.

**English Proficiency Requirement for International Applicants:** (See Graduate Education policies and procedures) (http://graduate.asu.edu/admissions/international/english_proficiency): Equivalent to ASU Graduate Education policy: TOEFL of at least 550 (PBT) or 80 (iBT), or IELTS overall band score of 6.5.

**Required Admission Examinations:** ☒GRE ☐GMAT ☐Millers Analogies ☐ None required

**B. Application Review Terms**

Indicate all terms for which applications for admissions are accepted and the corresponding application deadline dates, if any: This program will have rolling deadlines

**To select desired box**, place cursor on the left side of the box, right click mouse, select ***Properties***, under ***Default Value*** select ***Checked***, press ***OK*** and the desired box will be checked

☒ Fall Deadline (month/year): April, Same year

☒ Spring Deadline (month/year): October, prior year

☐ Summer Deadline (month/year):

**C. Projected annual admission/enrollment**

How many students will be admitted immediately following final approval of the certificate? What are enrollment projections for the next three years?

Up to 10 students will be admitted in the first cohort. In the next two years growth will be limited to a maximum of 30 enrolled students at the start of year 3. In year 2 we will evaluate the administration of this program and determine how many students we would be able to admit and manage in subsequent years.

## 4. ACADEMIC REQUIREMENTS

**A.** Minimum credit hours required for certificate (15 credit hour minimum) 15 hours

**B.** Please describe the primary course delivery mode, (e.g., online, face-to-face, off-site etc.). Please note: If this proposed initiative will be offered completely online, clearly state that in this section.

This program is to be entirely administered through online courses delivered via FSE's GOEE.

**C.** As applicable, please describe culminating experience required (e.g., internship, project, research paper, capstone course, etc.)

This program will not have a culminating experience.

**D.** What knowledge, competencies, and skills (learning outcomes) should graduates have when they complete this proposed certificate program? Examples of program learning outcomes can be found at (https://uoeee.asu.edu/program-outcomes).

The overall program outcome for this certificate is to prepare individuals in a variety of settings with the background to understand and communicate with key players in the field of neural engineering.

Specifically, program graduates will:

1) have facile knowledge in the areas of physiology and anatomy underlying neurotechnologies
2) be able to understand and apply the physical principles crucial to neurotechnologies
3) know the key technologies currently being used in neural interfaces
4) see trends in technology development in neural interface engineering

Performance on each of these outcomes will be measured primarily by performance on examinations, projects, and presentations in each of the courses forming the curriculum. For example:

- in the final exam in Clinical Neuroscience, students will see images of neural structures (MRI, brain sections), and asked to identify those structures and discuss the symptoms to be expected from damage to that structure.

- in the class presentations in Introduction to Neural Engineering, students will be expected to describe the elements of technologies used to build interfaces to the nervous system. This will include electrode configuration and materials, instrumentation used to record signals and/or stimulate neural tissue

- in the final presentations in Introduction to Neural Engineering, students will be expected to articulate some of the key problems with current neurotechnologies and speak to efforts to ameliorate those problems.

**E.** How will students be assessed and evaluated in achieving the knowledge, competencies, and skills outlined in 4.D. above? Examples of assessment methods can be found at (http://www.asu.edu/oue/assessment.html).

Student assessment will take place in each of the courses. Specifically, online examinations and performance on projects and project presentations will be used to determine the extent to which students have achieved each of the outcome goals for the program outlined in item D. above.

Several data will be collected to assess the overall effectiveness of the program in achieving its goals for students:

1) Course evaluations for the set of courses
2) Faculty comments on student performance in the courses
3) Post-graduate surveys will be taken to asses specifically (a) student satisfaction with the program, and (b) any changes in job following completion of the program.

These data will be assessed first at an annual curriculum meeting with the faculty involved in delivery of the program. In this meeting, we will evaluate the extent to which students are mastering the material in each of the courses, whether knowledge seems to be evident between courses, and which elements of the curriculum may need adjustment.

Finally, we will file a report each year with the SBHSE Advisory Board and seek their input on continuous improvements to the program.

**F.** Please state the Satisfactory student academic progress standards and guidelines (including any time limits for completion).

Students will be expected to complete this certificate program within 3 academic years. This will provide for one course per semester, since we anticipate recruiting current professionals to serve as a substantial component of this program. The three years also allows for one semester off, allowing for unforeseeable events in the lives of the enrolled students. If student exceeds the Graduate Education policy of a six year time limit, they will be recommended to Graduate Education for dismissal.

**G.** Will this proposed certificate program allow sharing of credit hours from another ASU degree program to be used as part of this certificate program? (Please note that a maximum of 9 graduate-level credit hours taken as a non-degree student at ASU, including as a part of a certificate program, may be used towards a future graduate degree at ASU).

Work in the neural engineering graduate certificate may be applied towards an M.S. or Ph.D. in Biomedical Engineering if the student chooses to continue. In the event of continuation, 9 hours of the student's work on the certificate program may be applied to the requirement of BME courses required for the M.S and PhD degrees with approval of their academic advisor.

**H.** Below, please list all required and elective courses in the appropriate boxes (you may attach additional pages if necessary).

Please ensure that all ***new*** *core* course proposals have been submitted to the Provost's office through the Curriculum ChangeMaker online course proposal submission system before this initiative is put on the University Graduate Council and CAPC agendas. Please note: a minimum of 2/3 of the courses required for a graduate certificate must be at the 500-level or above.

| **Required Courses** | | | **Credit Hours** |
|---|---|---|---|
| *(Prefix & Number)* | *(Course Title)* | *(New Course?) Yes or No?* | **(Insert Section Sub-total)** **6** |
| BME 526* | Introduction to Neural Engineering | Yes | **3** |
| BME 561* | Clinical Neuroscience | Yes | **3** |
| | | | |
| * | Both courses presently under review in Curriculum Changemaker | | |
| **Electives** *(Students choose 3 courses from the list below)* | | | **Credit Hours** |

| *(Prefix & Number)* | *(Course Title)* | *(New Course?) Yes or No?* | **(Insert Section Sub-total) 9** |
|---|---|---|---|
| **BME 556** | **Human Systems Neuroscience** | **N** | **3** |
| **BME 598** | **Neural Plasticity and Neurorehabilitation** | **N** | **3** |
| **BME 520** | **Bioelectric Phenomena** | **N** | **3** |
| **BME 521** | **Neuromuscular Control Systems** | **N** | **3** |
| **BME 598** | **Multisensory Integration** | **N** | **3** |
| **Culminating Experience (if applicable)** | | | **Credit Hours (Insert Section Sub-total)** |
| | | | |
| **Total required credit hours** | | | **15** |

**5. PRIMARY FACULTY PARTICIPANTS** - Please list all primary faculty participants for the proposed certificate, including home unit and title. You may attach additional pages if necessary.

| Name | Home Unit | Title |
|---|---|---|
| James Abbas | SBHSE | Associate Professor |
| Christopher Buneo | SBHSE | Associate Professor |
| Bradley Greger | SBHSE | Associate Professor |
| Jiping He | SBHSE | Professor |
| Stephen Helms Tillery | SBHSE | Associate Professor |
| Jeff Kleim | SBHSE | Associate Professor |
| Jitendran Muthuswamy | SBHSE | Associate Professor |
| Rosalind Sadleir | SBHSE | Assistant Professor |
| Marco Santello | SBHSE | Professor |
| Mark Spano | SBHSE | Research Professor |

**6. REQUIRED SUPPORTING DOCUMENTS**
**(Please label accordingly, i.e., Appendix or Attachment A, B, etc.)**

Please include the following with your proposal:

- **A.** Sample plans of study for students in the proposed program (see attached)
- **B.** Statements of support from all deans and heads of impacted academic units (see attached)

**7. APPROVALS -** If the proposal submission involves multiple units, please include letters of support from those units.

| DEPARTMENT CHAIR or SCHOOL DIRECTOR (PRINT/TYPE) | |
|---|---|
| MARCO SANTELLO | |
| SIGNATURE | DATE |
| VIA EMAIL – JH | |

| DEAN (PRINT/TYPE) | |
|---|---|
| SIGNATURE Jane L Coldfelter | DATE 3/21/14 |

**The following section will be completed by Graduate Education following the recommendations of faculty governance bodies.**

| VICE PROVOST FOR GRADUATE EDUCATION | |
|---|---|
| **SIGNATURE** | **DATE** |

**Please note:** Proposals for new certificates also require the review and recommendation of approval from the University Graduate Council, Curriculum and Academic Programs Committee (CAPC), the Academic Senate, 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.**

GF1112G-89

## APPENDIX

## OPERATIONAL INFORMATION FOR GRADUATE CERTIFICATES

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

**1. Provide a brief** (catalog type - no more than 150 words) **program description.**

Technologies for ameliorating neural disorders ranging from epilepsy and stroke to paralysis are developing rapidly. Understanding and deploying these technologies will require specialized skills in neurophysiology, bioelectricity, and neural-electronic interfaces. The Certificate in Neural Engineering will prepare clinical, industrial, and academic practitioners with those skills through a set of five online courses preparing students with core knowledge in neurophysiology, neuroanatomy, and neuropathology. Students will then go on to learn of the state-of-the-art neurotechnologies applied to current neural disorders, as well as the biophysics which these devices exploit.

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

| | | | |
|---|---|---|---|
| ☐ | Downtown | ☐ | Tempe |
| ☒ | Online (only)** | ☐ | West |
| ☐ | Polytechnic | | |

*** To select desired box**, place cursor on the left side of the box, right click mouse, select ***Properties***, under ***Default Value*** select ***Checked***, press ***OK*** and the desired box will be checked

** Online delivery will be via FSE's Office of Global Outreach and Extended Education program rather than ASU Online.

**3. Keywords:** (List all keywords that could be used to search for this program. Keywords should be specific to the proposed program.)

Neural engineering, neurotechnology, neuroanatomy, neurophysiology, neuroprosthetics

**4. Area(s) of Interest:**

*** To select desired box**, place cursor on the left side of the box, right click mouse, select ***Properties***, under ***Default Value*** select ***Checked***, press ***OK*** and the desired box will be checked

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

- ☐ **Architecture & Construction**
- ☐ **Arts**
- ☐ **Business**
- ☐ **Communications & Media**
- ☐ **Education & Teaching**
- ☒ **Engineering & Technology**
- ☐ **Entrepreneurship**
- ☐ **Health & Wellness**
- ☐ **Humanities**
- ☐ **Interdisciplinary Studies**
- ☐ **Law & Justice**
- ☐ **Mathematics**
- ☐ **Psychology**
- ☐ **STEM**
- ☐ **Science**
- ☐ **Social and Behavioral Sciences**
- ☐ **Sustainability**

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

- ☐ **Architecture & Construction**
- ☐ **Arts**

- ☐ Business
- ☐ Communications & Media
- ☐ Education & Teaching
- ☐ Engineering & Technology
- ☐ Entrepreneurship
- ☒ Health & Wellness
- ☐ Humanities
- ☐ Interdisciplinary Studies
- ☐ Law & Justice
- ☐ Mathematics
- ☐ Psychology
- ☐ STEM
- ☐ Science
- ☐ Social and Behavioral Sciences
- ☐ Sustainability

## (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.**

- Establishment of new curricular initiative requests; degrees, concentrations, or certificates
- Rename requests; existing degrees, concentrations or certificates
- Disestablishment requests; existing degrees, concentrations or certificates

☐ **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

☒ **Prepare the applicable proposal template and operational appendix for the proposed initiative.**

- New degree, concentration and certificate templates (contain proposal template and operational appendix) can be found at the Provost's Office Curriculum Development website: Academic Programs link

☒ **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 may be impacted by the proposed program 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 (will submit approved proposal to the 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 Graduate Education strongly recommends that academic units establish after the program is approved for implementation.

☐ **Set-up a Graduate Faculty Roster for new PhD Programs** – This roster will include the faculty eligible to mentor, co-chair or chair dissertations. For more information, please go to http://graduate.asu.edu/graduate_faculty_initiative.

☒ **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 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. Include in the handbook the unit/college satisfactory academic progress policies, current degree program requirements (outlined in the approved proposal) and provide a link to the Graduate Policies and Procedures website. Please go to http://graduate.asu.edu/faculty_staff/policies to access Graduate Policies and Procedures.

**APPENDIX A**

Sample plans of study for the Neural Engineering Graduate Certificate Program*

Sample plan of study for a student interested in Neural engineering for neuroprosthetics and with time for one course per semester

| Term | Semester | Course |
|---|---|---|
| 1 | Fall | BME 598: Introduction to Neural Engineering |
| 2 | Spring | BME 598: Clinical Neuroscience |
| 3 | Fall | BME 598 Human Systems Neuroscience |
| 4 | Spring | BME 598: Neuromuscular Control Systems |
| 5 | Fall | BME 598: Multisensory Integration |

Sample plan of study for a student interested in neural engineering for device design, with time for two courses per semester

| Term | Semester | Course |
|---|---|---|
| 1 | Fall | BME 598: Introduction to Neural Engineering |
| 2 | Fall | BME 598: Clinical Neuroscience |
| 3 | Spring | BME 520: Bioelectric Phenomena |
| 4 | Spring | BME 598: Neural Plasticity and Neurorehabilitation |
| 5 | Fall | BME 598: Human Systems Neuroscience |

* While this Graduate Certificate Program does not provide for separate tracks, we have built flexibility into the curriculum so that students with varying interests in Neural Engineering can take courses suited to their career aspirations.

**APPENDIX B**

Statements of Support for the Neural Engineering Graduate Certificate Program

**Ira A. Fulton Schools of Engineering**

**Official Submission**

**From:** Jeremy Helm [mailto:JEREMY.HELM@asu.edu]
**Sent:** Friday, March 21, 2014 1:07 PM
**To:** curriculumplanning@asu.edu; Amanda Morales-Calderon
**Cc:** James Collofello; Brian Skromme; Marco Santello; Stephen Helms Tillery
**Subject:** New Graduate Certificate - Neural Engineering

Good afternoon,

Please find attached an approved proposal to establish a new graduate certificate in Neural Engineering.

**Jeremy Helm**
Director, Academic Administration & Student Success
Ira A. Fulton Schools of Engineering
Arizona State University
Tempe, AZ 85287-8109
(480) 965-8931 voice
(480) 965-8095 fax

<Neural Engineering Certificate Proposal - (GE Review 3-24-13).DOCX>

**Letter of support from Marco Santello, Director SBHSE, regarding this certificate program**

School of Biological and Health
Systems Engineering
Box 8879709
Tempe, AZ 85287-9709

480-965-3028
FAX: 480-727-7624

February 18, 2014

To: FSOE

Re: Support for Graduate Certificate in Neural Engineering.

The Graduate Programs in Biomedical Engineering within the School of Biological and Health Systems Engineering is proposing to create a Graduate Certificate in Neural Engineering.

This certificate program is directly within the compass of SBHSE's graduate education mission, extends our efforts into professional and international environments. In its starting implementation, this program is manageable within the administrative structures that we have built for our existing degree (M.S. and Ph.D.) programs, and leverages our faculty's teaching activities to provide broader coverage with limited additional effort.

This program has my full support.

Regards,

Marco Santello
Professor & Director, School of Biological & Health Systems Engineering

**Email from Juergen Gadau, for SoLS, regarding this program and the proposed Certificate in Molecular, Cellular, Tissue, and Biomaterials Engineering program:**

HI Steve

These are create concentrations and I can imagine that some of our students from the Neurobiology, MCB or Microbiology Graduate programs might be interested to take individual courses or finish the whole certificate.

SOLS supports the creation of this new Graduate Certificates.

Ciao, Juergen

Jürgen Gadau
Professor
Associate Director of Graduate Studies SOLS
Arizona State University
Jgadau@asu.edu
480-965-2349
Web-page: http://gadau.lab.asu.edu/