The completed and signed proposal should be submitted by the Dean's Office to: curriculumplanning@asu.edu.
Before academic units can advertise undergraduate concentrations or include them in their offerings as described in the university catalogs, they must be recommended for approval by the Senate Curriculum and Academic Programs Committee and approved by the Executive Vice President and Provost of the University.

**Definition and minimum requirements:**
A concentration is a formalized selection of courses within a major.
- A concentration requires a minimum of 15 semester hours of which at least 9 semester hours must be upper division. Specialized concentrations (e.g., BIS Concentrations) may have additional or different requirements.
- A concentration is offered by a single unit and is intended exclusively for students pursuing a particular major. If a concentration consists of courses from more than one college the approval of each college Dean is required.

**College/School/Institute:** College of Technology and Innovation

**Department/Division/School:** Engineering

**Proposing Faculty Group (if applicable):**

**If this is an official joint degree program?** No

**Existing degree type and name of degree program under which this concentration will be established:** BSE Engineering

**Proposed Concentration Name:** Mechanical Engineering Systems

**Requested effective catalog year?** Fall 2013

**Delivery method:** On campus / polytechnic campus

Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.

**Campus/Locations:**
Indicate all locations where this program will be offered.
- [ ] Downtown Phoenix
- [X] Polytechnic
- [ ] Tempe
- [ ] West
- [ ] Other:

**Proposal Contact**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Ann McKenna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone number:</td>
<td>480-727-5121</td>
</tr>
<tr>
<td>Title:</td>
<td>Chair and Associate Professor</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:Ann.McKenna@asu.edu">Ann.McKenna@asu.edu</a></td>
</tr>
</tbody>
</table>

**DEAN APPROVAL(S)**

This proposal has been approved by all necessary unit and College/School levels of review. I recommend implementation of the proposed program.

<table>
<thead>
<tr>
<th>College/School/Division Dean name:</th>
<th>Please see email approval in support file.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td>Date: / /20</td>
</tr>
</tbody>
</table>

| College/School/Division Dean name: (if more than one college involved): |
|-----------------------------------|------------------------------------------|
| Signature | Date: / /20 |

Note: An electronic signature, an email from the dean or dean's designee, or a PDF of the signed signature page is acceptable.
1. Overview
   A. Description
   Provide a brief description of the new concentration (including the specific focus of the new concentration, relationship to other concentrations in this degree program, etc).

   The engineering department at the Polytechnic campus has a multidisciplinary engineering program with a concentration in Mechanical Engineering Systems. The multidisciplinary engineering program allows students to learn in a flexible problem-based curriculum with hands-on projects and the development of professional skills integrated into the program via project courses every semester. As a part of the flexible program, students can elect to take junior and senior mechanical engineering topic courses to complete a concentration in Mechanical Engineering Systems. A graduate with the mechanical engineering systems concentration will be able to provide leadership in engineering projects, which are intrinsically multi-disciplinary in nature, using mechanical engineering knowledge to design and control mechanical and/or thermal fluid systems. Students learn theory and application of materials, machine design, thermal fluid systems, energy and power from a systems perspective.

   B. Demand
   Explain the unit’s need for the new concentration (e.g., market demand, research base, direction of the discipline, and interdisciplinary considerations). How will the new concentration complement the existing degree program?

   As part of the EGR program in the College of Technology and Innovation at the Polytechnic campus, there is an existing Mechanical Systems focus area with significant student interest. This application supports the conversion of the existing focus area to a formal concentration. Enrollment has been between 15-26 students per year since 2009 in EGR 346 Engineering Design, a key focus area course. This enrollment is expected to significantly increase as the CTI Mechanical Engineering Technology programs are disestablished.

   Mechanical engineers design artifacts of a mechanical nature, including vehicles, biomedical implants, alternative energy sources and micro-mechanical devices. Mechanical engineering has been one of the fastest growing ASU degree areas. The Occupational Outlook handbook predicts a 9% growth in job demand between 2010 and 2020. Further, the Profiles of Engineering and Engineering Technology Degrees published by the American Society of Engineering Education shows a steady increase in national enrollment in mechanical engineering for the past decade.

   The mechanical engineering systems concentration will center on mechanical design and energy conversion including the design of machines and machine elements to solve a problem. Topics include thermodynamics, fluid mechanics, mechanical elements, controls and vibrations, materials and systems analysis. The program emphasizes a systems approach to solving problems and project based learning, both of which are different from the mechanical engineering program on the Fulton campus.

2. Support and Impact
   A. Faculty governance
   Provide a supporting letter from the chair of the academic unit verifying that the proposed concentration has received faculty approval through appropriate governance procedures in the unit and that the unit has the resources to support the concentration as presented in the proposal, without impacting core course resources.

   B. Other related programs
   Identify other related ASU programs and outline how the new concentration will complement these existing ASU programs. (If applicable, statements of support from potentially-affected academic unit administrators need to be included with this proposal submission.)

   The Ira A Fulton School of Engineering was consulted for comment and has no objection to the proposed concentration (email attached).

   C. Letter(s) of support
   Provide a supporting letter from each college/school dean from which individual courses, or the entire concentration, are taken.

3. Academic Curriculum and Requirements
PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE CONCENTRATION

A. Knowledge, competencies, and skills

List the knowledge, competencies, and skills (learning outcomes) students should have when they complete this proposed concentration. Examples of program learning outcomes can be found at [http://www.asu.edu/oue/assessment.html](http://www.asu.edu/oue/assessment.html).

- Students will describe the first and second laws of thermodynamics, systems, processes, equations of state, property tables, fluid statics, conservation of momentum, Bernoulli’s equation, and apply the theory to hands on problems.
- Students will identify and discuss the strength and physical performance, such as deformations and load-carrying capacity, of natural and artificial solid structures and apply this knowledge to calculate load carry capacity of natural and artificial solid structures.
- Students will apply fundamentals of mechanics in analysis and synthesis of machine components and systems, and analyze the impact on stress and failure.
- Students will apply modeling and control techniques for large and small-scale systems comprised of mechanical and electrical components and assemblies that are designed to work together.
- Students will be able measure and predict the vibration of objects and materials and apply this knowledge to modeling and analysis for design using vector mechanics as a mathematical analysis tool.
- Students will apply and evaluate design, communication, and critical thinking skills in a mechanical project setting.

B. Admissions criteria

List the admissions criteria for the proposed concentration. If they are identical to the admission criteria for the existing major and degree program under which this concentration will be established, please note that here.

Admission criteria mirrors that of the existing major and degree.
PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE CONCENTRATION

C. Curricular structure

Provide the curricular structure for this concentration. Be specific in listing required courses and specify the total minimum number of hours required for the concentration.

**Required Core Courses for the Degree/Major**

*Engineering Core (note: Additional supporting courses required within general studies are noted on major map)*

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Number</th>
<th>Title</th>
<th>Is this a new Course?</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR</td>
<td>101</td>
<td>Introduction to Engineering Design I</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>102</td>
<td>Introduction to Engineering Design II</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>104</td>
<td>Critical Inquiry in Engineering</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>201/202</td>
<td>Fall/Spring Multidisciplinary Project</td>
<td>N</td>
<td>3/3</td>
</tr>
<tr>
<td>EGR</td>
<td>218</td>
<td>Materials and Manufacturing Processes</td>
<td>Y</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>219</td>
<td>Computational Modeling of Engineering Systems</td>
<td>Y</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>280</td>
<td>Engineering Statistics</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>301/302</td>
<td>Fall/Spring Concentration Project</td>
<td>N</td>
<td>3/3</td>
</tr>
</tbody>
</table>

*Section sub-total: 36*

**Required Concentration Courses**

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Number</th>
<th>Title</th>
<th>Is this a new Course?</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR</td>
<td>340</td>
<td>Engineering Thermo-Fluids I</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>343</td>
<td>Mechanics of Solid Materials</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>346</td>
<td>Engineering Design</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>432</td>
<td>Engineering Thermo-Fluids II</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>EGR</td>
<td>445</td>
<td>Mechanical Engineering Systems</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>PHY</td>
<td>321</td>
<td>Vector Mechanics and Vibration</td>
<td>N</td>
<td>3</td>
</tr>
</tbody>
</table>

*Section sub-total: 18*

**Elective Concentration Courses**

| Prefix | Number | Title                                             | Is this a new Course? | Credit Hours |

*Section sub-total: 0*

**Other Concentration Requirements**

E.g. – Capstone experience, internship, clinical requirements, field studies, foreign language skills as applicable
EGR 401/402 Engineering Capstone Project I/II

Section sub-total: 6
Total minimum credit hours required for concentration 60* (conc + degree core)

Academic Curriculum and Requirements (Continued)

D. Minimum residency requirement
   How many hours of the concentration must be ASU credit? 6 credits

E. Provide a brief course description for each new course.

Degree Core:

EGR 216: Fundamentals of Engineering Systems I (3)
An introduction to modeling of engineering systems using mathematical and scientific principles. Modeling techniques include network models for electrical, fluid and heat systems; application of basic thermodynamic considerations to understand limitations in energy conversion; and application of basic mechanics of particles to model simple mechanical systems. In addition, the course will introduce the basic structure a modern electronic measurement system and relate this structure to measurement accuracy, precision and resolution.
Enrollment requirements: Prerequisite: CHM 113 or CHM 114, MAT 265

EGR 217: Fundamentals of Engineering Systems II (3)
Modeling of engineering systems at an intermediate level using mathematical and scientific principles. Modeling techniques include basic static and dynamic analysis of rigid bodies; electrical circuit analysis; simple frequency domain model linear systems; and applications of feedback in linear system models.
Enrollment requirements: Prerequisites: PHY 121, EGR 216

EGR 218 Materials and Manufacturing Processes (3)
Course description: Application of material properties and manufacturing processes to the design and fabrication of engineered artifacts.
Enrollment requirements: Prerequisites: CHM 113 or CHM 114

EGR 219 Computational Modeling of Engineering Systems (3)
Course description: An introduction to computing that develops software to find solutions to engineering problems. Students will write and document code to solve problems in data acquisition, modeling of physical systems, and optimization.

Note: All new required courses should be submitted in Curriculum Changemaker and ready for Provost’s Office approval before this concentration is put on Curriculum and Academic Programs Committee (CAPC) agenda.

4. Administration and Resources

A. How will the proposed concentration be administered (including admissions, student advisement, retention, etc.)?
   The concentration will be administered through the current structure and process for in place for the existing focus area, major and degree.

B. What are enrollment projections for the next three years?

<table>
<thead>
<tr>
<th></th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Yr. 1 continuing + new)</td>
<td>(Yr. 1 &amp; 2 continuing + new)</td>
<td></td>
</tr>
</tbody>
</table>
**PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE CONCENTRATION**

<table>
<thead>
<tr>
<th>Number of Students (Headcount)</th>
<th>entering)</th>
<th>entering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150*</td>
<td>159</td>
<td>169</td>
</tr>
</tbody>
</table>

*Projections based on enrollment in existing focus areas and expected growth as explained in demand statement.

C. **Resources**

What are the resource implications for the proposed concentration, including any 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 concentration 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 concentration.

No additional resources are required.

D. **Primary Faculty**

List the primary faculty participants regarding this proposed concentration. For interdisciplinary concentrations, please include the relevant names of faculty members from across the University.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Area(s) of Specialization as they relate to proposed concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Adam Carberry</td>
<td>Assistant Professor</td>
<td>engineering education and material science</td>
</tr>
<tr>
<td>Dr. Scott Danielson</td>
<td>Associate Professor</td>
<td>mechanical engineering</td>
</tr>
<tr>
<td>Dr. Chen-Yuan Kuo</td>
<td>Associate Professor</td>
<td>mechanical engineering and controls</td>
</tr>
<tr>
<td>Dr. Mark Henderson</td>
<td>Full Professor</td>
<td>mechanical engineering and design</td>
</tr>
<tr>
<td>Dr. Ann McKenna</td>
<td>Associate Professor</td>
<td>engineering education, mechanical engineering</td>
</tr>
<tr>
<td>Dr. Pavlos Mikelides</td>
<td>Associate Professor</td>
<td>mechanical engineering, thermodynamics</td>
</tr>
<tr>
<td>Dr. Changho Nam</td>
<td>Associate Professor</td>
<td>mechanical engineering, aerospace engineering</td>
</tr>
<tr>
<td>Dr. Dale Palmgren</td>
<td>Associate Professor</td>
<td>mechanical engineering, materials</td>
</tr>
<tr>
<td>Dr. John Rajadas</td>
<td>Associate Professor</td>
<td>mechanical engineering, thermodynamics</td>
</tr>
<tr>
<td>Dr. Sangram Redkar,</td>
<td>Assistant Professor</td>
<td>mechanical engineering, dynamics, controls</td>
</tr>
<tr>
<td>Dr. Bradley Rogers</td>
<td>Associate Professor</td>
<td>mechanical engineering, thermodynamics</td>
</tr>
<tr>
<td>Dr. Thomas Sugar,</td>
<td>Associate Professor</td>
<td>mechanical engineering, robotics, controls, design</td>
</tr>
<tr>
<td>Dr. Angela Sodemann</td>
<td>Assistant Professor</td>
<td>robotics, controls</td>
</tr>
</tbody>
</table>
5. Additional Materials

A. Major Map
   Attach a copy of the “proposed” major map for this degree program and each concentration(s) to be offered. Instructions on how to create a “proposed major map” in BAMD can be found in the Build a Major Map Training Guide.

B. Appendix
   Complete and attach the Appendix document.

C. Attach other information that will be useful to the review committees and the Office of the Provost.
APPENDIX
OPERATIONAL INFORMATION FOR UNDERGRADUATE CONCENTRATIONS
(This information is used to populate the Degree Search/catalog website. Please consider the student audience in creating your text.)

1. Proposed Concentration Name: Engineering (Mechanical Engineering Systems), BSE

2. Program Description (150 words maximum)
The Department of Engineering in the College of Technology and Innovation has a multidisciplinary engineering program with a concentration in mechanical engineering systems. The multidisciplinary engineering program allows students to learn in a flexible problem-based curriculum with hands-on projects and the development of professional skills integrated into the program via project courses every semester. As a part of the flexible program, students can elect to take junior and senior mechanical engineering topic courses to complete this concentration. A graduate with the mechanical engineering systems concentration will be able to provide leadership in engineering projects, which are intrinsically multi-disciplinary in nature, using mechanical engineering knowledge to design and control mechanical and thermal fluid systems. Students learn theory and application of materials, machine design, thermal fluid systems, energy and power from a systems perspective.

3. Contact and Support Information
   Building Name, code and room number: (Search ASU map)  
   TECH 101
   Program office telephone number: (i.e. 480/965-2100)  
   480/727-1874
   Program Email Address:  
   egr@asu.edu
   Program Website Address:  
   https://technology.asu.edu/egr

4. Delivery/Campus Information Delivery: On campus, Polytechnic campus
   Note: Once students elect a campus or Online option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.

5. Campus/Locations: indicate all locations where this program will be offered.
   - Downtown Phoenix
   - Polytechnic
   - Tempe
   - West
   - Other:

6. Additional Program Description Information
   A. Additional program fee required for this program? YES (the BSE in Engineering has a program fee)
   B. Does this program have a second language requirement? No

7. Career Opportunities & Concentrations
   Provide a brief description of career opportunities available for this degree program. If program will have concentrations, provide a brief description for each concentration. (150 words maximum)
   Mechanical engineers are in high demand in many different industry sectors, including agriculture, a wide variety of process industries, product development and manufacture, energy and defense systems. Mechanical engineers also work in close collaboration with other engineering disciplines in a wide variety of fields, including biomedical, building and construction, transportation and aerospace. Graduates from this program have a broad base of technical knowledge and operational skills that make them invaluable members of multi-disciplinary engineering teams, well suited for employment across the whole spectrum of applications.

8. Additional Admission Requirements
   If applicable list any admission requirements (freshman and/or transfer) that are higher than and/or in addition to the university minimum undergraduate admission requirements.)
   None
9. Keywords
List all keywords used to search for this program. Keywords should be specific to the proposed program.
Engineering, mechanical engineering, manufacturing, automation, design, energy, sustainability, medical

10. Advising Committee Code
List the existing advising committee code to be associated with this degree. UGTIEN
*Note: If a new advising committee needs to be created, please complete the following form:
Proposal to create an undergraduate advising committee*

11. First Required Math Course
List the first math course required in the major map. MAT 265 is the first required MA course.
The program also requires: MAT 266, MAT 267, MAT 275, MAT 343 for a total of 15 mathematics credits

12. Western Undergraduate Exchange (WUE) Eligible:
Has a request been submitted to the Provost by the Dean to consider this degree program as eligible for WUE? Yes, the program is WUE Eligible
*Note: No action will be taken during the implementation process with regards to WUE until approval is received from the Provost.*

13. Area(s) of Interest
A. Select one (1) primary Area of Interest from the list below that applies to this program.

- [ ] Architecture, Construction & Design
- [X] Engineering & Technology
- [ ] Artistic Expression & Performance
- [ ] Environmental Issues & Physical Science
- [ ] Biological Sciences, Health & Wellness
- [ ] Interdisciplinary Studies
- [ ] Business, Management & Economics
- [ ] Languages & Cultures
- [ ] Communication & Media
- [ ] Law & Justice
- [ ] Computing & Mathematics
- [ ] Social Science, Policies & Issues
- [ ] Education & Teaching
- [ ] Education & Teaching

B. Select any additional Areas of Interest that apply to this program from the list below.

- [ ] Architecture, Construction & Design
- [X] Engineering & Technology
- [ ] Artistic Expression & Performance
- [ ] Environmental Issues & Physical Science
- [ ] Biological Sciences, Health & Wellness
- [ ] Interdisciplinary Studies
- [ ] Business, Management & Economics
- [ ] Languages & Cultures
- [ ] Communication & Media
- [ ] Law & Justice
- [ ] Social Science, Policies & Issues
- [ ] Computing & Mathematics
- [ ] Computing & Mathematics
- [X] Education & Teaching
- [ ] Education & Teaching
- [ ] Education & Teaching

The following fields are to be completed by the Office of the Executive Vice President and Provost of the University.

CIP Code: ____________________
Plan Code: ____________________
### 2013 - 2014 Major Map
Engineering - Mechanical Systems, BSE (Proposed)

#### Term 1 0 - 14 Credit Hours

<table>
<thead>
<tr>
<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 115: General Chemistry I (SQ)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIT 101: Success in Technology &amp; Innovation</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 101: Introduction to Engineering Design I</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG 105 or ENG 107: First-Year Composition OR ENG 107: Advanced First-Year Composition OR ENG 105: English for Foreign Students</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 265: Calculus for Engineers I (PMA)</td>
<td>3</td>
<td>C</td>
<td></td>
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</table>

Term hours subtotal: 14

#### Term 2 15 - 29 Credit Hours

<table>
<thead>
<tr>
<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
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</thead>
<tbody>
<tr>
<td>EGR 101: Introduction to Engineering Design II</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 104: Critical Inquiry in Engineering I</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENG 105 or ENG 107: First-Year Composition OR ENG 107: Advanced First-Year Composition OR ENG 105: English for Foreign Students</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>MAT 266: Calculus for Engineers II (PMA)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY 121: University Physics I: Mechanics (SQ)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete ENG 101 or ENG 105 or ENG 107 course(s).</td>
<td></td>
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Term hours subtotal: 15

#### Term 3 30 - 44 Credit Hours

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<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
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<tbody>
<tr>
<td>EGR 201: Fall Multidisciplinary Project</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 216: Fundamentals of Engineering Systems I</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 218: Materials and Manufacturing Processes</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 280: Engineering Statistics (CS)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 267: Calculus for Engineers III (PMA)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Term hours subtotal: 15

#### Term 4 45 - 59 Credit Hours

<table>
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<tr>
<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
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</thead>
<tbody>
<tr>
<td>EGR 202: Spring Multidisciplinary Project</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 217: Fundamentals of Engineering Systems II</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 219: Computational Modeling of Engineering Systems</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities, Fine Arts and Design (HA)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 275: Modern Differential Equations (PMA) OR MAT 274: Elementary Differential Equations (PMA)</td>
<td>3</td>
<td></td>
<td></td>
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</table>

Term hours subtotal: 15

#### Term 5 60 - 75 Credit Hours

<table>
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<tr>
<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI 181: General Biology I (PMA) OR CHE 116: General Chemistry II (SQ) OR GG 203: Introduction to Geology I: Physical (SQ) OR GG 204: Introduction to Geology I: Laboratory (SQ)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 121: University Physics I (SQ) OR PHYS 131: University Physics II: Electricity and Magnetism (SQ) OR PHYS 132: University Physics Laboratory II (SQ) OR BIO 182: General Biology II (SQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 301: Fall Concentration Project</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 302: Engineering Themes I</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities, Fine Arts and Design (HA) AND Historical Awareness (HA)</td>
<td>3</td>
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<tr>
<td>Secondary Focus Area</td>
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Secondary Focus Area

- A secondary focus area is a group of courses comprising at least 12 or more credit hours (minimum 6 hours upper division at the 300 or 400 level) which form a coherent theme. For example, all courses may share a common subject prefix. Students work with an academic success specialist to identify their secondary focus area.

Term hours subtotal: 16

#### Term 6 76 - 90 Credit Hours

<table>
<thead>
<tr>
<th>Course Recommendations</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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Term hours subtotal: 16

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https://webapp4.asu.edu/programs/t5/roadmaps/ASU00/HCUZASW/null/ALL/2013

10/15/2012
**Term 1**

- **EGR 302: Spring Concentration Project** 3
- **EGR 343: Mechanics of Solids** 3
- **HST 318: History of Engineering (I, II, or SB) & G** 3
- **MAT 373: Applied Linear Algebra** 3

**Secondary Focus Area**

- A secondary focus area is a group of courses comprising 27 or more credit hours (minimum 6 hours upper division at the 300 or 400 level) which form a coherent theme. For example, all courses may have a common subject prefix. Students work with an academic success specialist to identify their secondary focus area.

**Term 2**

- **EGR 416: Engineering Design** 3
- **EGR 491: Engineering Capstone Project I (L)** 3
- **PHY 321: Vector Mechanics and Vibrations** 3
- **Social and Behavioral Sciences (SB)** 3

**Upper Division Secondary Focus Area**

Term hours subtotal: 15

**Term 7**

- **EGR 446: Engineering Design** 3
- **EGR 491: Engineering Capstone Project I (L)** 3
- **PHY 321: Vector Mechanics and Vibrations** 3
- **Social and Behavioral Sciences (SB)** 3

**Upper Division Secondary Focus Area**

Term hours subtotal: 15

**Term 8**

- **EGR 442: Engineering Thermo Fluids II** 3
- **EGR 445: Mechanical Engineering Systems** 3

**Upper Division Secondary Focus Area**

- **Upper Division Humanities, Fine Arts and Design (HSR)** OR
- **Upper Division Social and Behavioral Sciences (SB) AND**
- **Upper Division Cultural Diversity in the U.S. (C)**

Term hours subtotal: 15

**Total Hours:** 120

**Upper Division Hours:** 45 minimum

**Major GPA:** 2.0 minimum

Cumulative GPA: 2.50 minimum

**General University Requirements Legend**

- **General Studies Core Requirements:**
  - **Literacy and Critical Inquiry (L)**
  - **Mathematical Studies (M)**
  - **Computer/Statistics/Quantitative Applications (CQ)**
  - **Humanities, Fine Arts and Design (HFD)**
  - **Social and Behavioral Sciences (SB)**
  - **Natural Science - Quantitative (CQ)**
  - **Natural Science - General (SG)**

**General Studies Awareness Requirements:**

- **Cultural Diversity in the U.S. (C)**
- **Global Awareness (G)**
- **Historical Awareness (H)**
- **Post-Year Composition**

General Studies designations listed on the major map are current for the 2013-2014 academic year.

© 2007 Arizona State University
To: Elizabeth D. Phillips  
Executive Vice President and University Provost

From: Mitzi Montoya  
Vice Provost, Dean, and Professor  
College of Technology and Innovation

Date: September 23, 2012

Re: Establishment of Concentration in Mechanical Systems within the B.S. in Engineering

Please accept this memo of support for the establishment of the proposed concentration in Mechanical Systems within the B.S. in Engineering. The attached proposal has been developed by the faculty of Engineering, has been reviewed and approved through the established process within the college and has full support of the faculty and the College of Technology and Innovation dean's office.

The department of Engineering has sufficient resources to support the new concentration in Mechanical Systems without impacting the offering of core courses within the unit.

If you have any questions or concerns, please do not hesitate to contact me.

CC: Scott Danielson, Associate Dean of Academic Programs, College of Technology and Innovation  
Ann McKenna, Chair and Associate Professor, College of Technology and Innovation
Date: September 25, 2012

To: Mitzi Montoya  
Vice Provost, Dean, and Professor  
College of Technology and Innovation

From: Ann McKenna  
Chair and Associate Professor  
Engineering Department  
College of Technology and Innovation

Re: Establishment of Concentration in Mechanical Systems within the B.S. in Engineering

Please accept this memo of support for the establishment of the proposed concentration in Mechanical Systems within the B.S. in Engineering. The attached proposal has been developed by the faculty of Engineering, has been reviewed and approved through the established process within the department and the college and has full support of the faculty of the College of Technology and Innovation.

The department of Engineering has sufficient resources to support the new concentration in Mechanical Systems without impacting the offering of core courses within the unit.
From: James Collofello  
Sent: Wednesday, September 26, 2012 9:28 AM  
To: Scott Danielson  
Subject: RE: BSE in Engineering Concentrations Proposal Impact Statements  

Scott,

The engineering school does not have any concerns with the new proposed concentrations.

jim

James S. Collofello  
Associate Dean of Academic and Student Affairs  
Professor of Computer Science and Engineering  
School of Computing Informatics and Decision Systems Engineering  
Ira A. Fulton Schools of Engineering  
Arizona State University

From: Scott Danielson  
Sent: Tuesday, September 25, 2012 4:30 PM  
To: James Collofello  
Subject: BSE in Engineering Concentrations Proposal Impact Statements

Jim,

As per our conversations, I am asking for your comment on the attached proposals for three different concentrations to be offered by the BSE in Engineering program in the College of Technology and Innovation at the Polytechnic campus. It is my understanding that our Deans reached agreement on our offering these concentrations in previous conversations.

Thank you.

Scott Danielson, Ph.D., P.E.  
Associate Dean for Academic Programs  
College of Technology and Innovation  
Arizona State University